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# THE FISHER OMUVUBI

Analysing Issues

## UGANDA

WORLD AQUACULTURE SAFARI 2025 SPECIAL ISSUE

# EU-EAC True Fish Farming in the Lake Victoria Basin

## KIRYABISHORO AQUA PARK, IBANDA DISTRICT

13

Kiryabishoro Aqua Park, located in the Ibanda District of Uganda, represents a pioneering example of sustainable aquaculture

## THE FUTURE OF AQUACULTURE IS BLUE, GREEN...

16

Lake Victoria is at the heart of Uganda's growing aquaculture sector, especially in cage fish farming.

## UGANDAN WOMEN IN FISHERIES PROGRESS WITH GLOBAL STANDARDS OF FISH PROCESSING

21

Mariam Nankya shone during the International Women's day commemoration in Kyankwanzi district on the 8th of March 2025.



A photo of Yalalo Uganda; the biggest Aquaculture Farm in Lake Victoria. They are the winners for "The Best Aquaculture Enterprise Award" in recently concluded Sustainable Fisheries and Aquaculture Awards organised by Sustainable Fisheries Initiative in Uganda.

Full Story on Page: 2

## INSTITUTIONAL BACKGROUND

Lake Victoria Fisheries Organization (LVFO) is an institution of the East African Community (EAC) charged with

the management and development of fisheries and aquaculture. It was formed by a Convention in 1994 with major amendments in 2016. It is accommodated under Article

9.3 of EAC Treaty and registered as a regional fisheries management organization under the FAO UN Charter CAP102. The overall objective of the LVFO is to promote sustainable

management and development of the fisheries and aquaculture in order to contribute to food security and economic growth in the EAC

Continued to page 3,4,5,10 & 11

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## EMPOWERMENT

# EU-EAC True Fish Farming in L. Victoria Basin

**The overall objective of the project is to contribute to the development of a competitive, gender-equitable and sustainable commercial aquaculture sector**

region. The Lake Victoria Fisheries Organization (LVFO) in collaboration with Landell Mills, Food and Agriculture Organization (FAO) of the United Nations (UN), and WorldFish is implementing the European Union - East African Community TRUEFISH Farming Story in the Lake Victoria Basin Project, financed under the 11th European Development Fund (EDF 11), for the benefit of the East African Community (EAC).

The overall objective of the project is to contribute to the development of a competitive, gender-equitable and sustainable commercial aquaculture sector in order to support economic development and sustainable management of natural resources in the Lake Victoria Basin.

## The project aims to:

Remove key impediments to growth faced by investors to ensure a more rapid transition to a more efficient and sustainable sector. Address identified challenges and threats which could undermine the sustainability of aquaculture development, or could impact negatively on the environment, food security or livelihoods.

Promote harmonized aquaculture development in the region; e.g., through mechanisms for shared experiences, examples, and lesson learning.

The Project has three Specific Objectives (SO) (components), which are implemented as follows:

**SO1 BUSINESS:** to improve access to commercial networks for aquaculture-related businesses (Implemented by Landell Mills).

**SKILLS:** to increase availability and quality of local skilled workers for the development of aquaculture-related businesses (Implemented by FAO).

## SUSTAINABILITY:

to improve sustainability and bio-security of regional aquaculture production systems, with three subcomponents: (i) Strengthening aquatic animal health management (Implemented by FAO) (ii) Zoning of Lake Victoria (Implemented by FAO), and (iii) improved protection of biodiversity (Implemented by WorldFish).

## TARGETED COUNTRIES AND GROUPS

The project focus is particularly on the Lake Victoria Basin in Kenya,



**Farmed fish contributes to the development of competitive, gender equitable and sustainable commercial aquaculture**

Tanzania and Uganda however, the components on aquatic animal health and biosecurity is extended to Burundi and Rwanda.

## Key stakeholders, including:

The private sector: This includes private operators actively participating in various aspects of

the aquaculture supply chain such as the aquaculture associations.

National public sector training institutions: These include institutions in Kenya, Tanzania, and Uganda that are dedicated to providing specialized training and capacity building in aquaculture and related fields such as FTI (Uganda),

RIAT (Kenya), and FETA (Tanzania). Regional and national public sector actors: These are government and intergovernmental bodies that oversee and regulate aquaculture policies and activities at both national and regional levels.

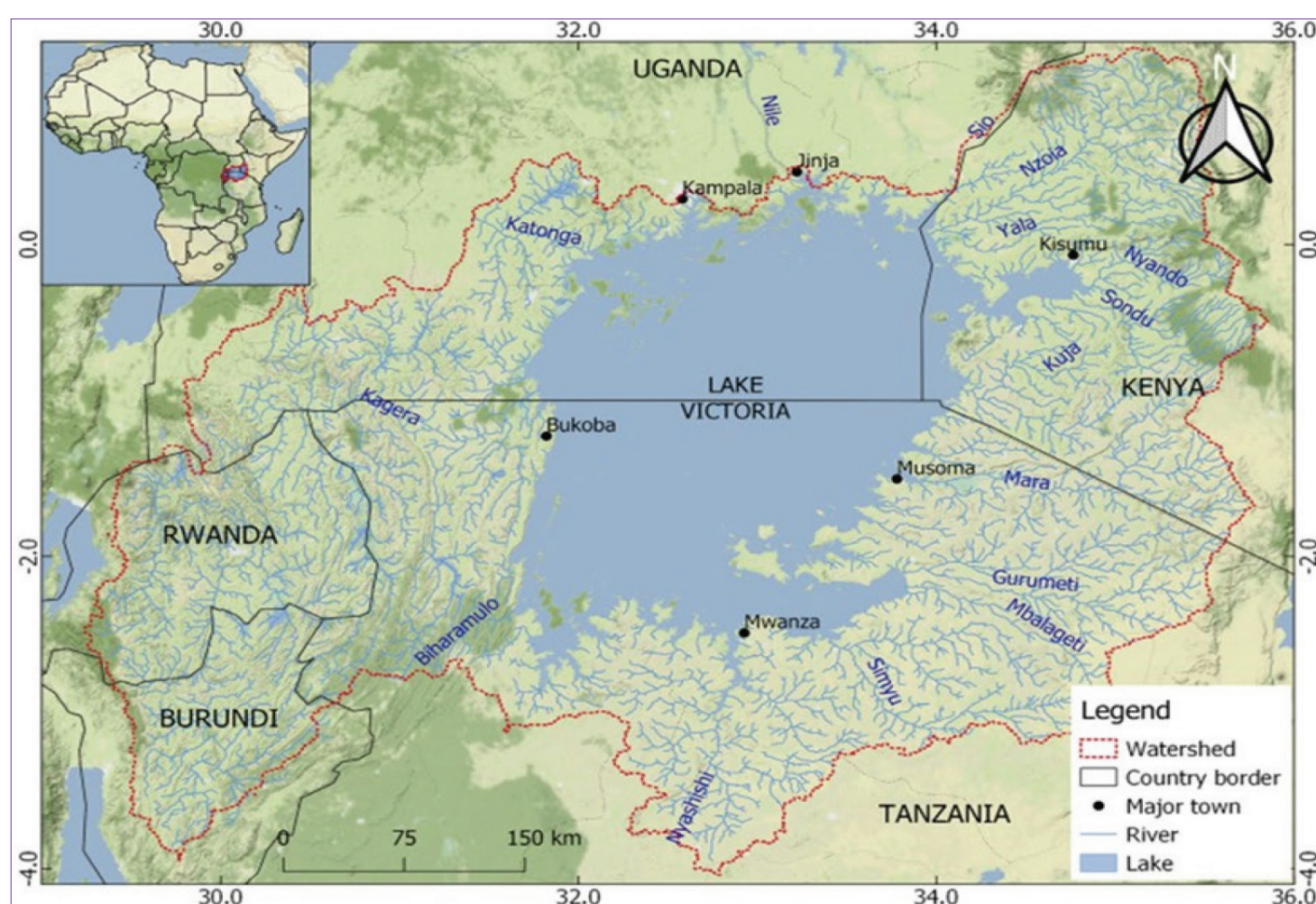
National fisheries research institutions and national competent authorities for aquatic animal health:

These organizations play a critical role in research, innovation, and maintaining the health standards of aquatic animals within the aquaculture industry.

Private sector operators not directly benefitting from project activities:

This includes stakeholders such as fish processors, traders, and the end-consumers of fish and fish products who indirectly benefit from improved aquaculture systems.

The project began on 13 December 2018, with implementation starting on 11 January 2021, initially set to conclude on 13 May 2025, but extended until December 2025 to complete the five years of effective implementation and to finalize key activities.





# What has worked within the 3 Specific Objectives?

## BUSINESS:

to improve access to commercial networks for aquaculture-related businesses

The project established a yearly Eastern Africa Regional Aquaculture Conference (EARAC) platform which started by organizing a conference online in September 2022 (EARAC I) then farmer centered conferences have been conducted both online and physical in Bondo, Kenya, in March 2023 (EARAC II) and Mwanza, in Tanzania in August 2024 (EARAC III).

The conferences provided a platform for stakeholders to exchange best practices, gain technical expertise, and participate in practical training to enhance productivity and sustainability in aquaculture, showcases regional aquaculture products and services, fostering new market linkages and attracting investment to boost the sector's growth and Connected farmers, policymakers, researchers, and service providers to build partnerships and strengthen regional and international cooperation in aquaculture.

The EARAC events have now become a recognized aquaculture conferencing brand in East Africa.



EARAC II Conference in Bondo, Kenya March 2023



Farmers attending basic training during the conference in Bondo, Kenya

*The selected farmers were leaders of aquaculture associations in Kenya, Tanzania, Uganda, Burundi and Rwanda and are expected to share information with other farmers in their countries.*



EARAC III Conference in Mwanza, Tanzania August 2024



Women showcasing their products during EARAC III in Mwanza

The project in collaboration with World Aquaculture Society is in preparation for hosting the World Aquaculture Safari '25 from 24th to 27th June 2025 in Entebbe, Uganda which is the upgrade of EARAC IV and AFRAQ 2025.

The World Aquaculture Safari'25 whose aim is to showcase Africa's aquaculture industry, emphasizing East Africa and Uganda, foster international collaborations and market linkages and expose East Africa to advanced aquaculture techniques, research, and investment opportunities.

It is expected to attract over 2,000 people and more than 100 exhibitors from across the world. Moreover, several side-events are already in planning around matters such as health management in aquaculture and sector investment.

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## EMPOWERMENT

# What has worked within the 3 Specific Objectives?

## World Aquaculture Safari 25 in Entebbe Uganda from 24th to 27th June 2025

The Project facilitated 36 EAC Aquaculture Farmers leaders, fisheries and environmental officers to conduct Study tours to farms and feed manufacturers companies in Egypt, China and Malaysia where they shared knowledge and best practices, created business-to-business (B2B) linkages and acquired tools for biosecurity risk management and biodiversity restoration.

The selected farmers were leaders of aquaculture associations in Kenya, Tanzania, Uganda, Burundi and Rwanda and are expected to share information with other farmers in their countries.

TRUEFISH is in the planning phase for the last study tour, which will see delegates from Kenya, Tanzania, Uganda, Burundi and Rwanda visit the country of Nigeria. This tour will take place early in 2025 and will focus on the well-known catfish farming sector in Nigeria, which will allow participants insight into both a different farming species, but also a different sector model. This will improve access to commercial networks for aquaculture-related businesses.



**Aquaculture Farmers visiting Women fish processors in Egypt**



**Aquaculture Farmers visiting Fish feed additives manufacturer company in China**



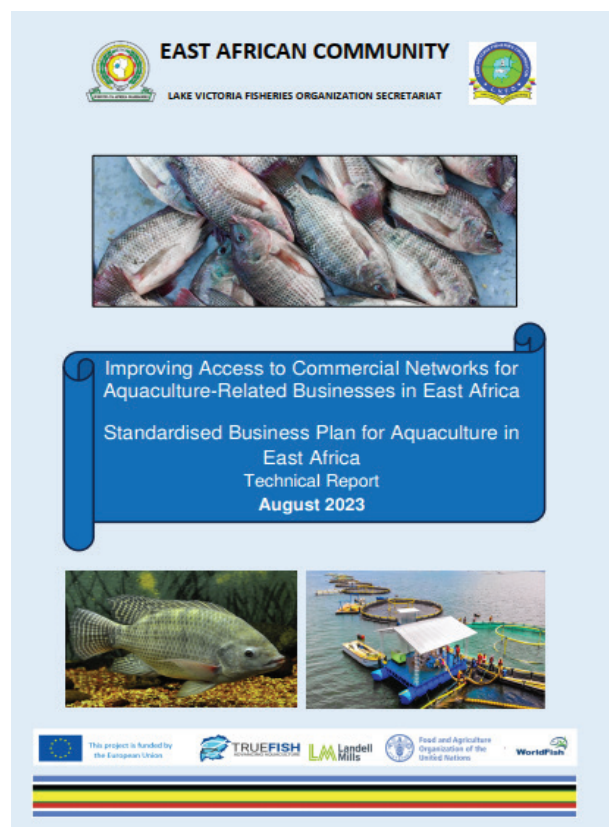
Fisheries and Environmental Officers receiving

certificates of participation in the international biosecurity study tour in Malaysia. The project supported the development of Standardised Business Plans for Tilapia and catfish which are the mostly farmed fish species in East Africa. The purpose of this Standardised Business Plan is to assist the Lake Victoria Fisheries Organization (LVFO) of the East African Community (EAC) to facilitate an increased flow of investment into the sector.



The development of Standardised Business Plans will further assist fish farmers to present credible bankable business plans and ease their interaction with financial institutions. Business orientation will also help farmers to become independent of donor support. Furthermore, the business plans will provide a framework of business information that can be used by farmers and aquaculture associations in approaching financial institutions.

The plans will also be used by financial institutions and sector investors to better provide and access finance, respectively.



## Standardised Business Plan for Aquaculture in East Africa

The project has also supported the national aquaculture associations in the East African

Community (EAC) to establish a Regional Aquaculture Association. This unified body strengthens sector advocacy, enhances bargaining power, and fosters greater collaboration and development within the aquaculture industry.

## Component 2 –

## Strengthening Skills Development & TVETs in Aquaculture

As a baseline during the first year of implementation (2021), three training institutions were assessed alongside the private sector, leading to the development and update of four Training Needs Assessments (TNAs). Based on these TNAs, three business plans (2022) were created for TVETs, focusing on infrastructure, personnel capacity, and curricula enhancement.

These business plans guided the development and validation of 12 specialized short courses for aquaculture professionals, covering topics such as hatchery management, pond and cage aquaculture, aquafeed formulation, fish health and biosecurity, value chain and market development, post-harvest handling, environmental management, aquaculture business management, sustainable aquaculture practices, fish genetics, ICT applications, and aquaculture regulations.



## Visit at FETA in Mwanza

Additionally, regular curricula upgrades were implemented at FTI, RIAT, and FETA, with FETA and FTI certifying six regular courses, pending final integration into academic programs along 2025. RIAT had undergone recent curriculum upgrades before project intervention.



## Visit at FTI Entebbe by the European Union Delegation to the EAC and implementers of TRUEFISH Project

A total of 35 TVET trainers were trained across 11 aquaculture disciplines through partnerships with Aquaculture Academy (Kenya), Bureau



Veritas (Nairobi), Dar es Salaam Maritime Institute (Tanzania), and FTI Boat Construction Center (Uganda). Furthermore, nine trainers underwent international training at the Freshwater Fisheries Research Center (FFRC) in China, specializing in cage aquaculture technology.



TVET staff capacity building in Food Safety for Aquaculture (Training of Trainers), Nairobi, Kenya in March 2023. Over €1 million worth of laboratory, breeding, processing, IT, and nautical equipment was supplied, with additional deliveries expected in 2025.



**Equipment procured for FTI, Entebbe, Uganda**



**Equipment procured for FTI, Entebbe, Uganda**



**STRIP FOUNDATION & FOUNDATION WALLING**



**LEVELING AND COMPACTION**

Lab construction works at RIAT in Kenya 170 farmers per country were trained (undergoing), contributing to a total target of 570 beneficiaries, including 120 farmers in Burundi and Rwanda, focusing on AAH farm-level training in 2025.



**Training of farmers in Machacos, Kenya**

A regional training network was also established, facilitating curricula alignment across TVETs, paving the way for mutual recognition of certifications and enhanced labor mobility within the region.

### **Component 3.1 – Enhancing Aquatic Animal Health (AAH) and Biosecurity**

A comprehensive one-year baseline effort (2021) developed five national AAH self-assessments and SWOT analyses, laying the groundwork for further strategic development.

The project supported the development of the Lake Victoria Regional Aquatic Animal Health Strategy which was endorsed by the Fisheries and Aquaculture Sectoral Council of Ministers (FASCOM) in Arusha Tanzania in its yearly seating in May 2024 and directed the Lake Victoria Fisheries Organization to assist participating countries to develop National Aquatic Health Strategy.

The strategy includes a regional list of pathogens affecting aquaculture and outlines 16 targeted biosecurity programs for implementation across the participating countries.

### **The implementation of the strategy is expected to achieve the following outcomes:**

Improved regional management of aquatic animal health and welfare by strengthening coordination among stakeholders and fostering collaboration among Lake Victoria Basin (LVB) countries to ensure effective management of aquatic animal health.

Enhanced awareness and capacity building through training programmes organized for aquatic animal health experts, aquaculturists, and other stakeholders regarding responsible and scientifically justifiable practices for optimal aquatic animal health management. Enhanced technical capacity at various expertise levels within Competent Authorities and other relevant agencies responsible for aquatic animal health management.

Collaborative efforts and confidence built among LVB countries to instill confidence in the aquaculture sector and other stakeholders in the efficacy of national Competent Authorities, state veterinary services, and relevant extension services.



Lake Victoria Basin Regional Aquatic Organism Health Strategy 2024-2034 (LVB RAOHS) The project supported the development of five National AAH strategies, launching five national disease surveillance plans, with fieldwork planned for 2025.

The project supported capacity-building initiatives which trained 75 officials in supply chain risk analysis, disease surveillance, and monitoring, with emergency preparedness and response training planned for 2025.



**Aquaculture farmers attending a field trip for Aquatic Animal Health training.**

A total of 120 farmers from five countries were trained in AAH farm-level practices through TVETs, which had been previously strengthened for this purpose by the project and an AAH international study tour is scheduled for Q1 2025 in the Philippines, facilitating knowledge exchange on biosecurity measures.

### **Component 3.2 – Improving Aquaculture Zoning & Spatial Planning**

A comprehensive two-year baseline study (2021-2022) analyzed the institutional and legal frameworks, socio-economic aspects, environmental impact, and remote sensing data for aquaculture development. Enhanced regional coordination was achieved through the establishment of the LVFO Zoning Working Group, integrating representatives from five countries.

The data collected and insights from the Zoning Working Group supported the development of a web-based spatial database platform, hosted by LVFO, featuring over 75 datasets related to aquaculture zoning.

**Continued to Pages 10 and 11**



## DEAR PARTICIPANTS, WELCOME TO THE WORLD AQUACULTURE CONFERENCE IN UGANDA.

**A**s we gather to share knowledge, expertise, and innovations in aquaculture during this global conference under the theme; "Aquaculture On The Rise" which highlights the growth and potential of Aquaculture in the fisheries sector, we're excited to showcase the latest developments and trends in the industry.

Uganda produces up to 15 000 tons of fish from aquaculture, including production from small-scale fish farmers, emerging commercial fish farmers and stocked community water reservoirs and minor lakes.

There are an estimated 20,000 ponds throughout the country with an average surface area of 500 m<sup>2</sup> per fish pond.

The Fisher-OmuVubi is a fisheries sector publication that shares news, research and innovations highlighting the conference's focus on sustainable fisheries and aquaculture practices, cutting-edge technologies, and collaborative approaches to addressing the challenges facing our sector. I hope you'll find the insights and perspectives shared within these pages informative, inspiring, and thought-provoking.

Let's work together to advance the future of aquaculture and ensure a food-secure world for generations to come.

I thank you!

## BREAKING WAVES:

### A Young Female Scientist's Journey in Fisheries Q & A with Faith Atukwatse, a Ugandan Fisheries and Aquaculture Expert

**Q: What is that one myth you know about the field of fisheries sciences?**

**Answer:** I didn't see any women ichthyologists when I was young. One thing I well knew was that the world of fisheries science is often perceived as a male-dominated domain. I have practically witnessed that even while at the University, only about 15% of my course mates were female. About 30% constituted the female mentors and lecturers that I meant along the journey.

This interesting trend followed up even in the field of work. While at my first job at a fish farm, the entire value chain was male dominated from boat to land and to the market.

**Q: Growing up not seeing any female counterparts in the fisheries field, what's one thing that inspired you to study fisheries and aquaculture?**

Well, to my former high school mates, I was re-known as a human neurosurgeon that turned out now to be a "fish neurologist." This was magic to me. While filling my job forms, I choose programs from human health, animal health, to natural resources. There was no that "one-specific" inspiration apart from the comfort I got in studying sciences (Biology was so real to me). However, along the University journey, the passion advanced every day.

**Q: From where and what did you study to be fisheries scientist?**

I pursued a Bachelors of Science in Fisheries and Aquaculture from Makerere University where I have again mastered in Zoology (specifically studying Fisheries and Aquaculture)

**Q: what challenges have you faced in your career journey**

As an early career woman in the practice of fisheries science, it is challenging to try to fit in with more senior scientists. This is an intimidating spot when you're young and trying to establish yourself in an industry.

I have been able to communicate and build a rapport with many fishers, fish farmers, researchers, policy makers, and managers to enhance knowledge and skills for my career advancement. I have learned these soft skills over the years. Working with different types of people and learning those kinds of social skills helps in the field quite a bit.

The real interesting part of studying aquatic science is the broad knowledge it instills in you with in line with aquatic ecosystems and commitment to sustainable practices for conserving nature resources. You fall in love with the fish, it's "house" (the water), and the "compound" (surrounding environment)!

This multidisciplinary field of science makes you move both around and far away from your reach in labs, fields, offices, and communities at all levels. Navigating the complexities of research, fieldwork, and advocacy cannot keep you the same. I have got an opportunity to shine on various platforms here in various countries Africa, in Europe, and America. Yes, with fish, I have moved to many countries and the sky is no longer a limit!!

**Q: What advice do you give to an early career woman who wishes to traverse the world?**

one must have ability to associate. While at University, I was a member of the Fisheries Students Association of Makerere University (FISAMU), I now belong to the Uganda Association of Fisheries Professionals of Uganda (UAFP). I am a member of African Women in Science (AWIS) a component of African Centre for Aquatic Research and Education (ACARE), among others.

Building strong networks, builds a strong career. Keeping contacts with all the value chain actors in your area of pursue is so important. Then lastly, one must use the networks for collaborative research, management, business development, and travel opportunities.

**Q: Are there specific challenges and opportunities you have faced because of being woman in your field of study?**

Pursuing a male-dominated field alone has presented to me both challenges and opportunities that have shaped my journey as a female scientist. Sometimes, your soft voice is drowned out but if this is proven by the ability to defend your point with facts, the voice shines. One's ability is proved by action, there is no room for folding hands.

I am determined to make waves, not just for myself, but for future generations of women aspiring to break into the sciences. The experiences, triumphs, and the hurdles in the intricate world of fisheries are chronicles of a strong career path. As a woman, it's so fascinating that you will study the fish, love it, cook it for yourself, and for your family. It's sweet being a woman fish scientist.

**Q: What is your key message to the key stakeholders**

A collective responsibility is important for the girl child to have a platform to change the world of science. If all stakeholders can collaborate, define the means and resources to educate and support more females in the fisheries and aquaculture science, this world will be a better place with lots of fish

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## QUALITY ASSURANCE

Global Programme Sustainable Fisheries and Aquaculture

# Promoting hygiene and quality for fishery and aquaculture value chains

## Food safety as a cornerstone of food security and income generation

### RELEVANCE

Fishing is one of the most important sectors for meeting the world's food needs. As a healthy and nutritious food source, it can make a decisive contribution to food security as well as being an important economic driver for people living in poverty. However, according to FAO a third of the world's oceans are considered to be overfished and 35 % of all fish caught for human consumption is spoiled on the way and never make it to our plates.

Food is perishable by nature and spoilage can occur at any stage of the value chain, from production to distribution. Fisheries and aquaculture are known for their fresh product range, which unfortunately has a very short shelf life. It is also susceptible to a variety of biological, chemical and environmental risks that can have a negative impact on food quality. Unsuitable breeding methods in aquaculture, overfishing, environmental pollution and a lack of infrastructure, just to name a few, can reduce product quality and make hygienic processing more difficult. This makes ensuring safe, affordable and high-quality food a major challenge. In view of the growing world population and the increasing demand for fishery and aquaculture products, the assessment and regulation of food safety issues will continue to gain in importance.

Spoiled food goes to waste and in the fishing sector, food is thrown away on a big scale. At the same time, it is estimated that around 923 million people worldwide suffer from chronic hunger. In addition, the health of another 2.0 billion people are affected by nutritional deficiencies. The nexus of fisheries/aquaculture and food quality/hygiene plays an important role in combating hunger and malnutrition. This is set out in the Sustainable Development Goals (SDGs). SDG 2 is centred around the access to safe, sufficient and nutritious food whereas SDG 6 aims to improve hygiene in the food sector among others.

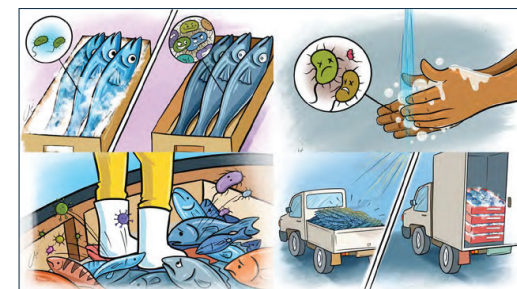
The Global Programme "Sustainable Fisheries and Aquaculture" is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development. The aim of the programme is an increase of fish supply from sustainable and resource-friendly fisheries and aquaculture to boost a healthy and diverse nutrition in Cambodia, India, Madagascar, Malawi, Mauritania, Uganda and Zambia. Sustainable production and processing techniques are promoted along the value chain in order to create jobs and income, with a special focus on youths and women. Local organizations are strengthened in their capacities to carry on programme interventions on a long-term basis. And policy advice is contributing to favourable framework conditions for a sustainable development of the fisheries and aquaculture sector in the implementing countries.



Fish inspections by the Mauritanian office for hygiene controls in the interior of the country.

With so many different actors, there are certain topics that are only important to some while other topics are clearly important for everyone: raising awareness of biochemical processes such as microbes, knowledge about food-borne infections and diseases, maintaining personal hygiene at the workplace, recognizing fresh and spoilt products, using ice to uphold the cold chain or cleaning and disinfecting the workplace and equipment. However, while fishermen are primarily concerned about the accurate storage and immediate cooling to prevent the deterioration of their catch, processors focus more on the hygienic handling of the processing equipment. Accordingly, it is essential to adapt learning content and teaching methods to the different actors along the value chain, like demonstrations of storage and cooling systems on the fishing boats, or on-the-job trainings concerning proper handling of processing equipment.

Furthermore, didactics must be developed that take into account the experience of fisheries and aquaculture experts. In the context of high illiteracy diagrams, drawings and photographs can be used. Also, the language must be adapted to the target group. In addition, training content



Pictures as learning content to understand what microbes are.

can be gathered and summarized in small booklets e.g. guidelines that provide the actors with a long-term option to revise training contents. Here, as with the training content, it is advantageous to adapt the guidelines to the different actors in the value chain, e.g. one guide for fishing, another for processing and so on. By doing this, value chain actors can be addressed directly and do not lose their learning ambition by going through learning content that does not fully affect their work. Finally, the dissemination of the guidelines should be adapted to the local context; not every country has the same media capacities but in addition to handing out printed versions, apps proofed to be a way to spread training contents easily.

To ensure that the theoretical hygiene and quality trainings become actual practice, it is essential to discuss and confirm understanding with trainees. Using short feedback forms and coaching loops post-training helps verify and further improve learning and communication effectiveness. Additionally, evaluating knowledge application, such as willingness to invest in ice for fish storage, is key. Highlighting the long-term benefits, like quality improvement and potential for higher prices, despite initial costs, is crucial for convincing participants of the value.

In addition to understanding, the implementation of training content must also be taken into account. It is important to find out at an early stage which hygiene practices are feasible in the local context. If the purchase price of ice does not justify the additional benefit of fresh quality, no trainee will adhere to the training content. To stay with the example of ice, the question also arises as to whether the necessary infrastructure is in place: are there ice producers, operational cold chains and the necessary equipment? Next to the spread of misinformation, the greatest danger in communicating training content lies in conveying messages that simply cannot be implemented by the local trainees, as they do not have the means to do so or the supporting infrastructure is just too unstable.

## PROMOTING HYGIENE AND QUALITY FOR FISHERY AND AQUACULTURE VALUE CHAINS

### APPROACH

#### Promoting good hygiene and quality practices along the value chain

To ensure quality and safety in the fish value chain, from catch to consumer, it's vital to consider all steps of the value chain due to potential food safety risks. Implementing hygiene and quality trainings, introducing first sale certificates, and establishing control plans for state institutions are key interventions. A thorough value chain analysis is crucial for identifying improvement areas and requires visits to actors and review of hygiene regulations. Based on this analysis, targeted interventions can be identified, ranging from policy to practical actions, involving research enhancement, regulatory support, and capacity development.

The direct actors in the value chain are fishermen, retailers, traders, transporters, warehouse workers and suppliers who are involved in the production, processing, delivery or sale of a product to the consumer. They are the first point of contact when it comes to offering the consumer a safe product of high quality. Accordingly, they represent the target group that needs to be informed about the hygienic handling of products and the aspects of production, storage

and transportation deteriorating quality. The implementation of a training plan can strengthen knowledge about hygiene, quality and control practices for the various steps of the value chain.

With so many different actors, there are certain topics that are only important to some while other topics are clearly important for everyone: raising awareness of biochemical processes such as microbes, knowledge about food-borne infections and diseases, maintaining personal hygiene at the workplace, recognizing fresh and spoilt products, using ice to uphold the cold chain or cleaning and disinfecting the workplace and equipment. However, while fishermen are primarily concerned about the accurate storage and immediate cooling to prevent the deterioration of their catch, processors focus more on the hygienic handling of the processing equipment. Accordingly, it is essential to adapt learning content and teaching methods to the different actors along the value chain, like demonstrations of storage and cooling systems on the fishing boats, or on-the-job trainings concerning proper handling of processing equipment.



QUALITY ASSURANCE

Global Programme Sustainable Fisheries and Aquaculture

Promoting hygiene and quality for fishery and aquaculture value chains

PROMOTING HYGIENE AND QUALITY FOR FISHERY AND AQUACULTURE VALUE CHAINS



Training of inland fishmongers to discover the research side of quality checks.

Next to the post-training feedback the effectiveness of the training can be assessed through a second follow-up survey, reflecting on key elements of its content. The timing between these evaluations varies with the topic; for instance, 3–6 months may be sufficient to review acceptance to personal hygiene practices, such as handwashing at work. However, evaluating changes like the use of ice for fish storage on boats might require up to a year, accounting for off-seasons and fishing periods. Even if evaluations are time-consuming, they are crucial to revise, adapt and further develop training materials to meet the needs of the participants.

In terms of the capacity development approach, a training-of-trainers strategy can be implemented in the training plan. Training local knowledge brokers like chairmen of fishing or trading associations or market supervisors in the field of hygiene and quality can have a lasting effect in anchoring this knowledge within partnering institutions and in generating spill-over effects through word of mouth at regional level. Sensitising consumers and buyers is also crucial to understand the importance of fresh fish. Hardly anyone will take on additional work and costs to create a quality product that is not demanded.

Direct partnerships for institutional anchoring of hygiene and quality standards

In addition to the direct actors at the operational level, institutional decision-makers, independent quality offices, certification bodies and research institutions are key actors to implement quality assurance of fish products on a national scale. The complexity of the value chain, which interferes with the traceability of the product, and the significant geographical distances between fish producers and consumers present a substantial challenge in maintaining the quality of fish. Therefore, it is difficult to trace back the product's source when spoiled or inferior fish reaches the consumers.

Fish production and distribution are conducted both formally (e.g. through organized cooperatives) and informally by individuals. In most developing countries, the fish value chain predominantly follows an informal market system with limited quality management and traceability systems for fish. In the absence of traceability, there are concerns about trust and transparency in the marketing and consumption of fish in terms of the quality, food safety and price of products, which ultimately affects both consumers and fish sellers.

Direct partnerships with local food inspection authorities can be promoted to enable compliance with quality and hygiene standards to be checked throughout the value chain and to address the issue of traceability. On the other hand, non-compliance goes hand in hand with discarding spoiled fish from the market. The discard is an efficient incentive to adhere to the implementation of quality standards because it is immediately accompanied by a loss of income for the fisherman or trader.

A hygiene and quality control plan – developed jointly with local inspection authorities – helps to guarantee regular sampling and analysis of fishery and aquaculture products. The control measures must target the complete value chain e.g. boats, production facilities, means of transportation, processing plants as well as distribution and sales points and be carried out systematically. This is only possible if all the necessary laboratory and health testing equipment is available and can be used by local staff. Training and exchange trips to comparable institutions in other countries improve the employees' ability to handle new equipment and technologies and consolidate their knowledge of different analytical methods and processes of hygiene inspections.



Employee of the Mauritanian bureau of sanitary inspections carrying out a quality analysis.

Implementation experiences should be regularly discussed with political decision-makers, associations and value chain actors. To secure efforts sustainably, it is important to integrate the costs of the sampling and analysing into the annual financial plans of the inspection authorities and to acquire financial contributions for the long term. Clearing out financial obstacles is more likely to be successful if the hygiene and quality control plan is in line with local political strategies.

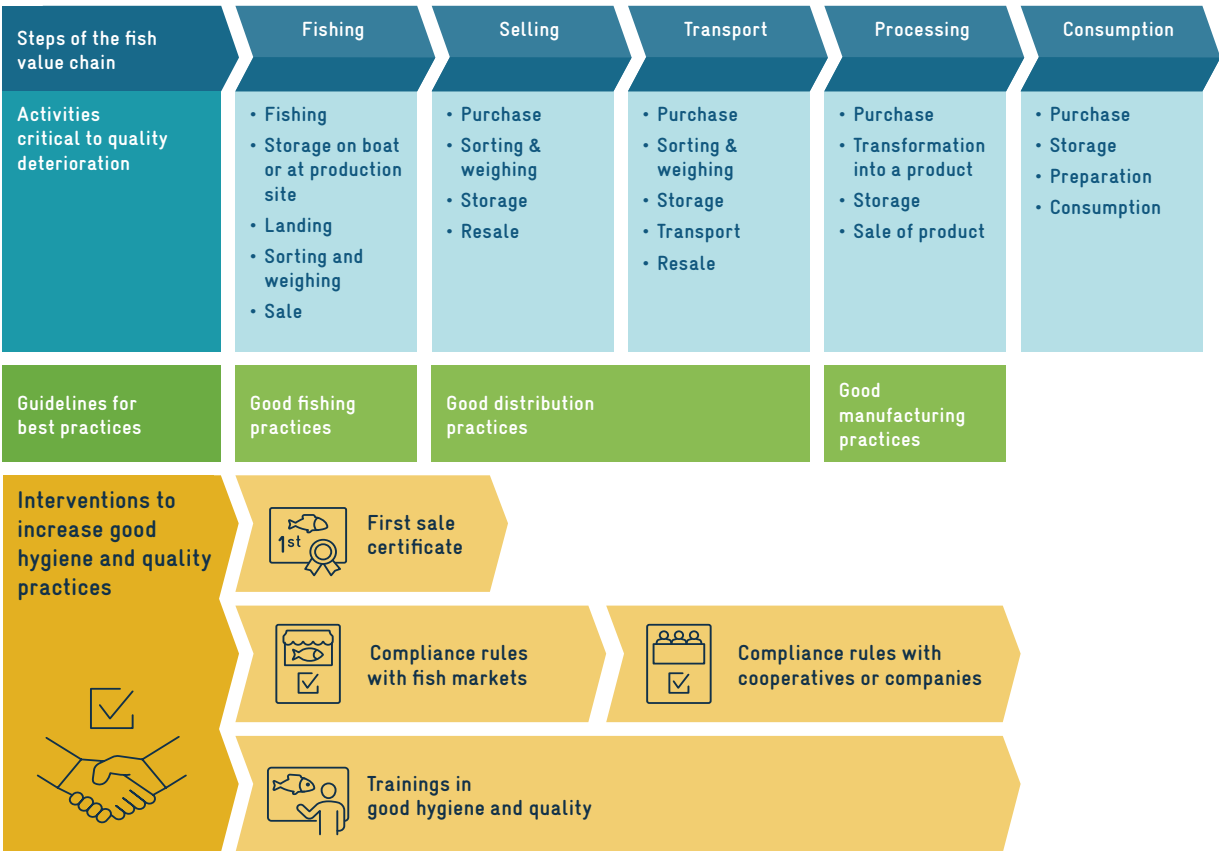
In order to improve the traceability and control of fishery and aquaculture products, so-called first sale certificates can be introduced by local inspection bodies. They should be issued at the most important landing or production points and contain information on the species, the origin of the product, the seller and the destination. Digital certificates are suitable for registering the above-mentioned information directly at the first sales at the production and landing points and should be monitored centrally. This facilitates the authorities' work and saves resources.

To further enhance compliance of the value-chain actors with hygiene and quality standards, action plans can be developed in direct cooperation with fish markets, fish auction halls and other important transshipment points of sale. The action plan must set out the measures being planned, a timetable, the financial and material resources required and a monitoring and evaluation system for ensuring the envisioned hygiene and quality standards.

Organizational and procedural measures may include: a commitment by the management of these trading centres to take responsibility for the hygiene and quality of fishery products, an adapted organizational chart for better control of the hygiene and quality of products, a charter for an extended committee to support the implementation of the action plan and/or a code of good hygiene practices for the employees of the respective entity.

In addition, mobile applications can help to connect information from both sides. For example, the direct actors

INTERVENTIONS ALONG THE FISH VALUE CHAIN





## QUALITY ASSURANCE

Global Programme Sustainable Fisheries and Aquaculture

# Promoting hygiene and quality for fishery and aquaculture value chains

## PROMOTING HYGIENE AND QUALITY FOR FISHERY AND AQUACULTURE VALUE CHAINS

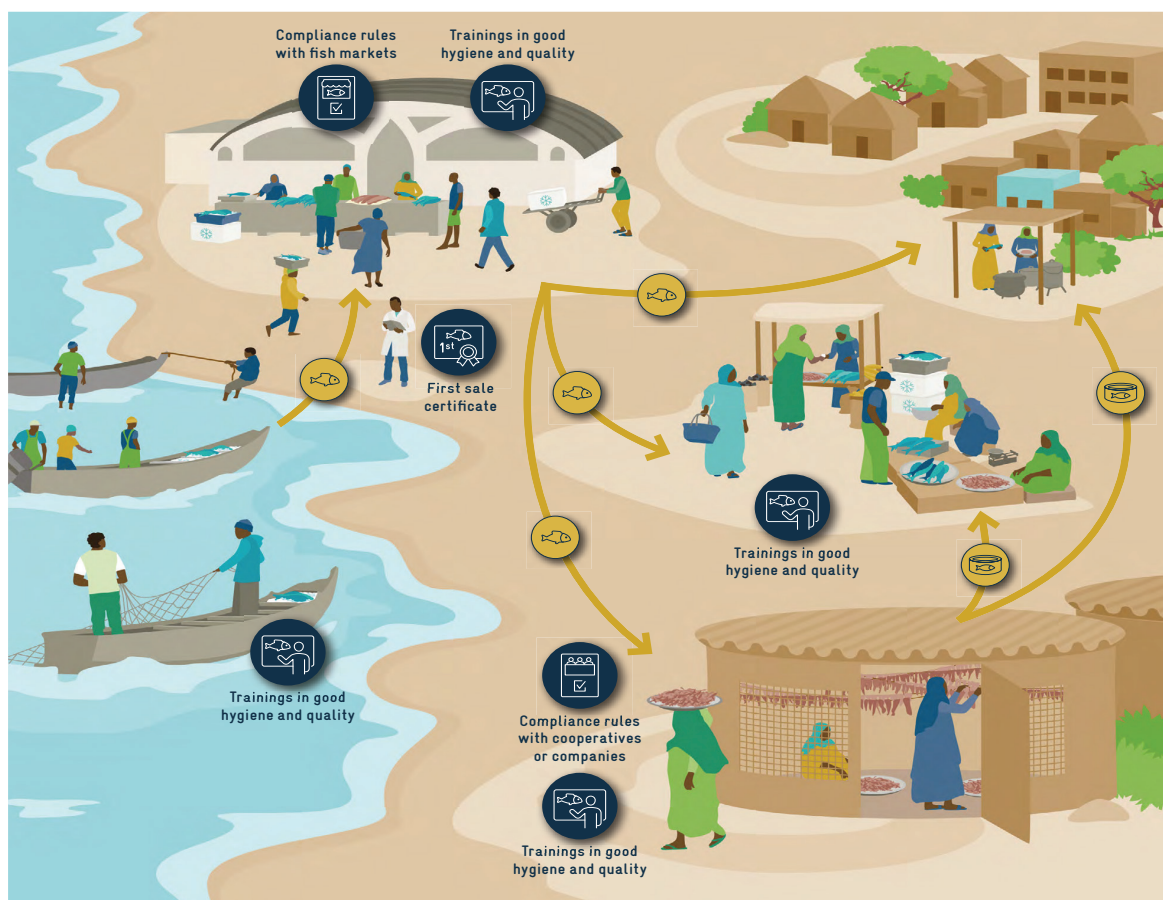
in the value chain can receive information on hygiene and quality requirements of the fish market or the procedure of getting a first sale certificate at the same time the fish market can register stands and actors and provide an overview for hygiene inspectors where and when to perform quality inspections. At the same time, an app can simplify the exchange of best practice guidelines, training materials, as well as other communication products interesting for the sector (advertisements, recipe videos, etc.).

### IMPACT

The interventions described here are intended to have two effects. First, they should increase the income of the actors in the value chain, as better fish quality is sold at higher prices. Second, the availability of (better) fish products on local markets that are suitable for human consumption should be increased as quality goes up and post-harvest losses go down.

It should be noted that training in good hygiene and quality practices, as well as compliance action plans and first sale certification, benefit consumer protection while helping to reduce food waste. If the quality of the fish is maintained throughout the value chain, more fish of better quality can be sold, which leads to an increased income for value chain actors. At the same time, the consumer benefits as they can enjoy healthier fishery and aquaculture products and have a larger selection because more catch arrives at the fish markets.

Also, other effects can be expected in addition to income generation and food security. Reducing post-harvest losses might be the most efficient way to bring more fish into the value chain without increasing fishing pressure on the already overexploited fish populations. In this sense, a good quality and hygiene structure in the value chain is inevitable for a sustainable fisheries management.



PROJECT INTERVENTIONS ALONG THE FISH VALUE CHAIN IN MAURITANIA

### CASE STUDY

#### The hygiene and quality control plan for better protection of consumers of small pelagic fish in Mauritania

In October 2019, the government partner, the National Office for the Sanitary Control of Fisheries and Aquaculture Products (*Office National d'Inspection Sanitaire des Produits de la Pêche et de l'Aquaculture*, ONISPA), launched the hygiene and quality control plan for small pelagic fishery products for local and sub-regional consumption.

The control plan is in line with the government's strategy to ensure the supply of high-quality and nutritious fish to the population. It enables ONISPA to strengthen its presence in order to protect consumers and improve food safety in Mauritania. The implementation of this control

plan is accompanied by a training plan for ONISPA professionals to develop their skills in analytical and sanitary control techniques specific to the local value chains of small pelagic fish. Four laboratories were set up in Nouakchott, Nouadhibou, Rosso and Tanit and a registration procedure for first sales is enforced by ONISPA inspectors to improve controls and traceability of products.

The aim of the control plan is to control artisanal fishery products in order to verify that they meet the quality and hygiene requirements in the value chain. The measures of the control plan extend from coastal areas to the interior of the country and target artisanal and coastal fishing vessels, means of transportation, processing plants and distribution and sales outlets. This is the first time that the control and inspection measures have been systematically carried out far from the coastal areas inland.

**giz** Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

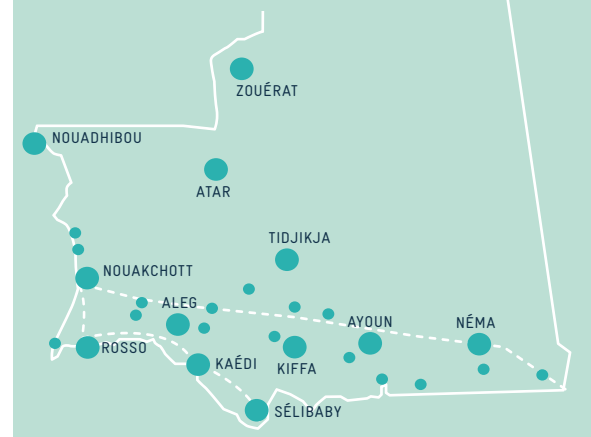
Founded in 2007, ONISPA is an institution under the supervision of the Ministry of Fisheries and Maritime Economy. Its main tasks are the application of national and international regulations on the quality and hygiene of fishery products, the control of the entire value chain and the issuing of health certificates. It has four inspection offices and two laboratories for chemistry and microbiology in Nouakchott and Nouadhibou, which are accredited according to ISO 17020 and ISO 17025.



### SOME FIGURES TO DATE

- 3 inspection and control teams in the field
- 169 sites throughout the country inspected since the launch (markets, landing sites, processing plants, platforms, storage containers, cold rooms)
- 42 laboratory technicians and inspectors were trained in 8 trainings
- 933 bacteriological and chemical analyses were carried out

### AREAS REACHED BY THE HYGIENE AND QUALITY CONTROL PLAN



Published by:  
Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices  
Bonn and Eschborn, Germany

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Bonn, 2024



EMPOWERMENT

Continued from Page 5

Improved protection of biodiversity



Participants pose with their certificates of attendance

Large-scale feasibility maps were created for Lake Victoria and riparian countries, supporting the identification and designation of two Aquaculture Management Areas (AMAs) per country to minimize habitat and social impacts. Carrying capacity was modeled and calculated for these AMAs, while optimized farm site selection aimed at reducing disease spread and environmental impacts. The project also delivered training to 35 professionals and specialized personnel from TAFIRI, NAFIRRI, and KMFRI in spatial planning and water quality monitoring. The development of regional aquaculture zoning guidelines and an updated regional aquaculture management plan is expected to be finalized by 2025.

Component 3.3 – improved protection of biodiversity

The project, in collaboration of

EAC fisheries and aquaculture research institutions such as National Fisheries Resources Research Institute (NaFIRRI), Kenya Marine and Fisheries Research Institute (KMFRI) and Tanzania Fisheries Research Institute (TAFIRI) conducted study on Genetic Diversity of Tilapia Populations aimed to develop advanced techniques for conserving tilapia diversity. The findings highlighted high genetic diversity among lake populations and distinct separation between species, which are critical insights for biodiversity conservation strategies.

The study also identified weak population structure for Oreochromis niloticus across the LVB, showing that nearly all sampled populations form a large, genetically admixed group. For farmed tilapia, diversity estimators revealed no

evidence of inbreeding, indicating healthy genetic diversity within aquaculture operations.

Accidental hybridization on fish farms likely occurs due to the close proximity of different fish species and the challenge of distinguishing species at the juvenile stage. The presence of multiple hybrid fish in production ponds may result from a single hybrid mating, rather than multiple independent hybridization events. These findings underscore the importance of maintaining genetic variation to support both conservation and aquaculture productivity.

The project supported training of 12 members of Genetic working group, 12 junior scientists in molecular biology and bioinformatics and 3 researchers at the Earlham Institute (UK) in genetic screening and mapping.



Scientist from NaFIRRI, KMFRI, TAFIRI sampling tilapia from Lake Victoria basin, under the genetic screening study.

Junior scientists training in molecular biology and bioinformatics at BecA ILRI, Nairobi Kenya The project conducted also a study on the assessment of how social dimension mainstreaming (Gender) can be reflected in the design of the proposed fish genetics screening research in EAC Lake Victoria Basin,

The study has revealed that within the Lake Victoria basin, women are intimately involved in the aquaculture value chain. Their role is especially evident in the processing and vending of aquatic organisms for fish feed, as well as in the processing and marketing of the final product to consumers. In addition, women are increasingly engaged as investors, technical operatives as workers in hatchery and aquaculture production facilities.

REASONS FOR THE SUCCESS OF THE EAC TRUEFISH PROJECT

The understanding between the EAC and harmonious collaboration with the LVFO as the central coordinator of the project lead to success of the TRUEFISH project. However, the TRUEFISH Project’s success can be attributed to its comprehensive approach, which combines sustainability, collaboration, innovation, education, market demand, and strong regulatory frameworks. These factors work together to create a system that benefits both the environment and the fishing industry. Strong Institutional Collaboration:

The partnership between the European Commission and East African Community as well as implementers such as LVFO, Landell Mills, FAO, WorldFish, and national research institutions like NaFIRRI, KMFRI, and TAFIRI has provided technical expertise, resources, and coordination to achieve project objectives effectively. In addition, the endorsement and support from the East African Community (EAC) institutions and member states have ensured alignment with regional priorities. Comprehensive and Targeted Approach: The project





## EMPOWERMENT

addressed key challenges through a multi-pronged approach, focusing on business networks, skills development, sustainability, aquatic animal health, aquaculture zoning, and biodiversity conservation. Specific objectives were well-defined, with measurable outcomes and strategic actions that directly respond to the sector's needs.

**Capacity Building and Knowledge Sharing:** Training initiatives targeted farmers, trainers, researchers, and policymakers, enhancing technical and business skills across the aquaculture value chain. Study tours to countries like Egypt, China, Malaysia, and Nigeria allowed stakeholders to learn from successful models and implement best practices in their operations. **Stakeholder Engagement and Participation:** Involvement of key stakeholders, including the private sector, public institutions, and farmers' associations, fostered ownership and ensured that project activities were practical and relevant. Platforms like the Eastern Africa Regional Aquaculture Conference (EARAC) and the upcoming World Aquaculture Safari '25 have facilitated networking, advocacy, and collaboration.

**Promotion of Innovation and Technology:** Development of standardized business plans and aquaculture zoning tools provided frameworks for sustainable investment and environmental management. Integration of advanced techniques, such as genetic diversity studies and spatial planning, has improved aquaculture practices and biodiversity conservation efforts. **Significant Investments in Infrastructure and Equipment:** Over €1 million worth of laboratory, breeding, processing, IT, and nautical equipment were supplied, boosting the capacity of training institutions and research facilities. Business plans



**Researchers collecting samples**

and curricula upgrades for TVETs ensured that training institutions are better equipped to support the sector.

**Focus on Gender and Social Inclusion:** The project emphasized the role of women in aquaculture value chains and incorporated gender-sensitive approaches in training and research activities. Studies on the social dimensions of aquaculture helped address gender equity and participation in aquaculture development.

### **Regional and International Recognition:**

The EARAC platform has become a recognized brand for aquaculture conferences in East Africa. Hosting of World Aquaculture Safari '25 will showcase the region's achievements and opportunities, attracting global attention and investment. **Flexibility and Adaptability:** The project adapted to emerging needs, such as extending its implementation period to ensure the effective completion of activities and maximize impact. Adjustments, such as focusing on biosecurity and expanding training efforts, addressed challenges that could undermine aquaculture sustainability. **Focus on Long-Term Sustainability:** The development of regional strategies for aquatic animal health, aquaculture zoning,

and biodiversity conservation ensures continuity beyond the project's lifecycle. Harmonized curricula, development of short courses for enhancing skills for aquaculture workers and mutual recognition of certifications will enhance labor mobility and foster regional integration in the aquaculture sector.

### **LESSONS LEARNT FROM THE EU-EAC TRUEFISH PROJECT**

The EU-EAC TRUEFISH Project has demonstrated several lessons learned based on its achievements. These lessons highlight best practices, challenges overcome, and key takeaways that can guide future initiatives in similar contexts. Additionally, they point to the potential for replication in other regions.

**Capacity Building Drives Sustainability:** Training and skills development, such as staff exchanges among RIAT, FETA, and FTI, have strengthened institutional capacity and improved the quality of fisheries and aquaculture education in the region.

Investments in technical education ensure that local stakeholders can manage and sustain aquaculture systems effectively.

### **Regional Collaboration Enhances Impact:**

The collaboration between regional institutions under the Lake Victoria Fisheries Organization (LVFO) fostered knowledge sharing, harmonized curricula, and promoted joint solutions to common challenges. Cross-border partnerships can lead to shared ownership and long-term sustainability.

### **Integration of Policy and Practice is Essential:**

Activities like developing aquaculture management plans, improving biosecurity, and integrating aquaculture into regional policies demonstrated the importance of linking technical efforts with regulatory frameworks. Alignment with global and regional instruments ensures that project outputs are relevant and impactful.

### **Market-Oriented Development is Key:**

Emphasizing value chain development, market access, and aquaculture enterprises ensures that interventions lead to tangible economic benefits for local communities. Strengthening SMEs and cooperatives enhances livelihoods and contributes to regional economic growth.

### **Infrastructure and Technological Advancement Boost Sector Growth:**

Investments in infrastructure, such as laboratories, fish processing and quality assurance systems, enable compliance with market standards and increase competitiveness in international markets.

### **Stakeholder Engagement Ensures Inclusivity:**

Engaging stakeholders at all levels, from small-scale farmers to policy makers, ensured that interventions were inclusive and met the needs of diverse beneficiaries. Supporting gender-sensitive approaches further enhanced equity and participation.

### **Monitoring and Evaluation Enhances Effectiveness:**

Regular assessments and data collection enabled adaptive management, ensuring the project stayed aligned with its goals and addressed emerging challenges.

## COULD IT BE DONE ELSEWHERE?

Yes, the EU-EAC TRUEFISH Project's approach can be replicated in other regions, provided the following considerations are addressed:

**Contextual Adaptation:** Projects must be tailored to the local context, considering ecological, cultural, and socio-economic conditions of the target region.

**Strong Regional Framework:** A regional body or organization (e.g., LVFO) is necessary to facilitate collaboration and harmonize efforts across borders.

**Policy and Institutional Alignment:** Policies should be aligned with international guidelines and frameworks

while addressing the specific needs of the region.

**Long-term Funding and Commitment:** Sustainable funding mechanisms, such as public-private partnerships or donor funding, are crucial for long-term success.

**Focus on Capacity Building:** Strengthening human resources, institutions, and infrastructure is fundamental to creating a self-sustaining system.

**Stakeholder Ownership:** Engaging stakeholders from the start and ensuring their active participation is key to ensuring the program's acceptance and sustainability.

## CONCLUSION

The EU-TRUEFISH project has catalyzed sustainable aquaculture development in the Lake Victoria Basin by addressing barriers in business, skills, and sustainability.

Through capacity building, policy harmonization, and regional collaboration, it has strengthened livelihoods and biodiversity. Initiatives like the World Aquaculture Safari'25 aim to position East Africa as a global aquaculture hub.

## ACKNOWLEDGMENTS

Lake Victoria Fisheries Organization (LVFO) sincerely thanks the European Union (EU) for their funding, which has been crucial to advancing aquaculture in the East African Community (EAC). We also appreciate the EAC for their collaboration, as well as the technical support from the FAO, Landell Mills, and WorldFish.



## FISH FARMING

# Discovering Aquaculture in a Land Rich In Inland Waters: The Ugandan Aqua Park District

Gianluigi Negroni – 2024

Uganda is a landlocked country, but it is rich in natural water bodies. Fishing plays an important role in both the subsistence and commercial livelihoods of its population. Among the national fisheries resources, Lake Victoria is by far the largest and most economically significant. Other key water bodies include large lakes such as George, Edward, Albert, and Kyoga, the Nile River, as well as various swamps and watercourses.

The 68,000 square kilometers of Lake Victoria are shared between Uganda (45%), Tanzania (49%), and Kenya (6%). The total catches peaked at 461,500 tons in 2014, then declined to 389,600 tons in 2017, and later rebounded to 603,000 tons in 2019. Over the past decade, the catch of Nile perch (*Lates niloticus*), the most commercially valuable species, has continued to decline from its peak in 2005 (175,000 tons) to less than 74,000 tons in 2017. In 2018, the Nile perch catch recovered to 80,000 tons. In 2019, there were an estimated 43,293 small uncovered boats, 97% of which were less than 12 meters in length. Aquaculture is being developed, particularly for tilapia and cat fish, to meet the increasing demand for fish products from the growing local population.

## Fish Farming in Uganda:

A Promising Future In Uganda, fish farming, or aquaculture, is gaining momentum as a critical industry to meet the increasing demand for fish. As natural fish stocks from lakes and rivers become more vulnerable to overfishing, pollution, and environmental changes, the expansion of aquaculture offers a sustainable solution to maintain fish supply for the growing population.

The government of Uganda, along with international organizations and private investors, has been promoting fish farming as a viable economic opportunity. Key species that are being farmed include Nile tilapia (*Oreochromis niloticus*) and African cat fish (*Clarias gariepinus*), which are well-suited to the country's environmental conditions and have high market demand.

## Benefits of Fish Farming in Uganda:

Aquaculture contributes to food security by providing a consistent

and sustainable source of protein, essential for the local diet.

### Income Generation:

Fish farming creates employment opportunities, particularly in rural areas, offering both direct and indirect jobs in the value chain, from hatcheries to fish processing. As the industry grows, there is significant potential for Uganda to become a regional exporter of farmed fish to neighbouring countries particularly with a high demand for fish.

### Challenges in Aquaculture Development:

Despite its potential, the aquaculture sector in Uganda faces several challenges that need to be addressed to ensure sustainable growth. One of the main challenges is the availability of quality fingerlings (young fish) for stocking fish ponds. The government and private sector are working to establish more hatcheries and improve breeding techniques. The cost of fish feed is a significant expense for fish farmers, and there is a need for locally produced, affordable feed options that maintain high nutritional value (the author already published some practical application of locally made fish diet). Proper water management for quality and quantity (this includes the cost of the energy to pump the water, water supply by gravitation is the best option) is essential to prevent diseases and ensure optimal growth conditions for the fish. Farmers require training and resources to maintain healthy water quality in their ponds.

### Aquaculture Practices and Techniques

To support the development of aquaculture in Uganda, various techniques are being promoted:

**Pond Culture:** This is the most common form of fish farming in Uganda. It involves the construction of earthen ponds where fish are stocked, fed, and harvested. Pond culture allows for controlled water management and fish growth.

**Cage Culture:** In areas where access to land is limited, cage culture is becoming increasingly popular. Fish are raised in cages placed in

open water bodies, such as lakes and rivers, allowing for efficient use of space and natural water resources.

### Future Outlook for Aquaculture in Uganda

The future of fish farming in Uganda looks promising, with continued investment in infrastructure, training, and research. As the sector expands, it has the potential to significantly contribute to the country's economic development, providing food, income, and employment for millions of Ugandans. The Aqua Park is one solution and should practice polyculture, introducing both tilapia and cat fish in the same pond. The cat fish would eat the young tilapia, regulating the population.

Both tilapia and cat fish could be fed with self-produced feeds using locally available ingredients (several practical successful studies were done on this subject). The Aqua Park should be supported with a small feed mill for in-house feed production.

The Department of Aquaculture Management and Development (MAAIF) should assist with specific training activities as was done by the author and colleagues through the PESCA project (Promotion of Environmental Sustainable Commercial Aquaculture).

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## WHATS IS AN AQUA PARK?

An aquaculture park, also known as an «aquaculture park», «aquaculture cluster», «aquaculture village» or «aquaculture industrial park», refers to a modern aquaculture organizational model developed to support small-scale farmers in a sustainable aquaculture value chain. It complies with aquaculture development policy, regulations and the scope of aquaculture zoning and planning, supporting relevant aquaculture industrial value chain clusters within a given geographical landscape.

Generally, an aquaculture park involves the main elements of aquaculture production, such as aquatic seed, feed and growth suppliers, and extends to related functions of processing, transportation, marketing and trade.

### The main objectives

are to provide a supply of quality inputs, services and growth production at scale, within a framework of available industrial clusters and organized stakeholders in production and operation, knowledge exchange and innovation where various ponds, cages, tanks and infrastructure are designed/ built to optimise the production of the aquaculture value chain.

The aquapark goes beyond the mere aggregation of fish farms; it represents an integrated ecosystem that supports small-scale fish farmers at every stage of the aquaculture value chain.

### Here are some key features of a fish farming aquapark:

**Planning and Zoning:** Areas are specifically allocated for aquaculture activities, ensuring efficient use of space and resources.

**Infrastructure Development:** Essential infrastructure such as roads, water supply and electricity are provided, eliminating major barriers for farmers with an integrated approach to the aquaculture value chain (and access to marketing).

**Market Access:** Fish farmers are connected to reliable markets, ensuring fair prices and a steady income stream.

### Technical Support and Training:

Farmers have access to extension services, production/supply of inputs such as fingerlings and feed. This aquapark model has been adopted in various parts of the world to promote sustainability and improve the productivity of small-scale aquaculture.

Some Uganda aquapark successful approaches are in the next lines.



# Kiryabishoro Aqua Park representing a pioneering example of sustainable aquaculture development in Uganda.



*An aerial view of Kiryabishoro Aqua Park located in Rwambu, Kijongo- Ibanda district*

**The Kiryabishoro Aqua Park, located in the Ibanda District of Uganda, represents a pioneering example of sustainable aquaculture development.**

Set in the lush landscape of western Uganda, the park is strategically situated near abundant water resources, making it an ideal location for fish farming. The park was established as part of a broader initiative to promote aquaculture in Uganda's rural areas. It serves as a model facility, demonstrating how fish farming can be implemented effectively while promoting environmental conservation and providing economic opportunities for local communities.

## Infrastructure and Facilities:

The Kiryabishoro Aqua Park features an extensive system of fish ponds, hatcheries, and water management infrastructure, designed to ensure optimal conditions for fish growth and sustainability. The park focuses on the production of Nile tilapia and African catfish, two species that are in high demand in both local and regional markets. The park's ponds are well-constructed, with precise water flow control mechanisms to maintain high water quality.

In addition to the ponds, the park includes a feed production unit, allowing it to produce high-quality, affordable feed for the fish. This reduces the dependency on expensive commercial feed and ensures that the fish are raised on a nutritious diet.

## Environmental Sustainability:

Environmental sustainability is at the core of Kiryabishoro Aqua Park's operations. The park practices polyculture, combining different fish species in the same pond to enhance biodiversity and reduce environmental impact. By doing so, the park mimics natural ecosystems, where different species coexist and contribute to the balance of the environment. Moreover, the park employs water recycling techniques, where water from the fish ponds is used to irrigate nearby agricultural fields, ensuring that nothing goes to waste. This integrated approach to resource management allows the park to contribute to both fish production and agricultural productivity in the region.

## Community Involvement and Economic Impact

The Kiryabishoro Aqua Park has had a significant impact on the local community. It provides employment opportunities, particularly for youth and women, in various aspects of the operation, from fish farming to feed production and maintenance of the facilities. Additionally, the park serves as a training center for local farmers, offering workshops and practical demonstrations on best practices in aquaculture. Through these efforts, the park is helping to build the capacity of small-scale fish farmers in the region, enabling them to adopt sustainable and profitable aquaculture techniques.

The fish produced at the park are sold both locally and in larger markets, contributing to food security and providing a reliable source of income for those involved in the project. The park's success has also attracted interest from potential investors and government agencies, who see it as a model for expanding aquaculture across Uganda.

## Challenges and Future Prospects:

Despite its success, the Kiryabishoro Aqua Park faces several challenges. The high cost of fish feed remains a major issue, as it affects profitability. The park is actively working to develop more cost-effective, locally sourced feed options to address this problem. Additionally, access to markets continues to be a challenge due to limited infrastructure, particularly in terms of transportation and cold storage.

The park's management is collaborating with government agencies to improve infrastructure and logistics, which will enable the park to reach more customers and expand its operations. Looking ahead, the Kiryabishoro Aqua Park has ambitious plans for growth. There are discussions about expanding the park's facilities, increasing the number of fish ponds, and further developing its hatchery capabilities to supply fingerlings to other farmers in the region. With continued support from the government and international partners, the Kiryabishoro Aqua Park is poised to become a leading hub for aquaculture in Uganda, driving economic development while promoting sustainable fish farming practices.

**By Bakora Moses - Team Leader Sustainable Fisheries Initiative**



*Kiryabishoro Aqua Park is serene and picturesque tourist destination that captures not only the essence of Ibanda's natural beauty but also improving livelihoods of the communities around it as well as local revenue to the district.*



## QUALITY CONTROL

# Exploring QAMA the unsung Heroes of the Fisheries Sector.

The late 1990's were a trying period for the fish processing industry in Uganda. Given the huge dependency on the European Union market by all the fish factories in Uganda (Approx. 75% of all exports) dictates that they must adhere to EU marketing regulations. The industry has been forced to evolve and develop better Quality monitoring and assurance systems leaning from past experiences. The industry faced huge losses as a result of two fish bans in the late 1990's namely;

### First Fish Ban

The year was 1996 during the Rwandan genocide, a ban was placed on fish from Lake Victoria because of dead bodies that were thrown in the lake. The following year, due to El Nino extreme weather, the whole region of the great lakes was affected by floods and cholera, again prompting EU to ban fish from the East African countries including Mozambique.

Many factories reacted by upgrading to meet the quality standards as demanded by the EU market. In line with the EU quality regulations, most factories largely adapted renovations, though some factories have had to quit the business completely. The Fish ban was finally lifted in July 1998.

### Second Fish Ban

Meanwhile as the competent authority (Uganda National Bureau of Standards, UNBS) was striving to upgrade Uganda's EU export status from "List 2" to "List 1" (like Tanzania) by early April 1999, another fish ban was placed on fish from Lake Victoria/Uganda, due to fish poisoning (destructive fishing method employed by fishers).

"List 1", exports have total free access to the EU markets, an arrangement referred to as "full harmonisation". Uganda being a

"List 2" exporter, its rights to trade on the EU market depend on bilateral country-to-country arrangements and the fate of its fish export trade being in the hands of individual countries. This means that fish upon arrival in Europe is subject to scrutiny, but this ban suspended even this arrangement.

The second Fish ban was lifted in October 2000 after the Department of Fisheries Resources introduced a residue monitoring programme.



**Uganda Fish processors and exporters association (UFPEA) the quality managers undertaking skills enhancement training at Makerere University**

### UFPEA interventions to save the industry.

With the events taking place in the industry the Uganda Fish Processors & Exporters Association which is the umbrella organisation representing the private sector in the fisheries sub-sector devised a lasting solution to ensure quality integrity of products from its member companies. This led to formation of the Quality Assurance Managers Association (QAMA) which is the technical arm of UFPEA.

### The Quality Assurance Managers Association (QAMA)

QAMA membership is comprised of Quality Assurance Managers of the fish factories that are members of UFPEA and receives funding for its activities from UFPEA the parent association. QAMA has always participated in the formulation of fish quality related documents at all stages their input is highly respected.

QAMA works in partnership with the Competent Authority which is the Directorate of Fisheries Resources to address any quality challenges and alerts whether local or international with the purpose of not only sorting them up but also putting out measures to curtail future reoccurrence. QAMA also works in partnership with the National Standards body -Uganda National

Bureau of Standards (UNBS) in the formulation and implementation of national standards that relate to the fisheries sector. This includes formulation of new standards as the market may demand.

QAMA is also involved in working together with the suppliers of both raw material fish, packaging material and chemicals with a purpose of having them adhere to the stringent required standards expected of them. QAMA serves as a technical link for absorbing any technical support or assistance extended to the fish factories in all fields of food safety from development partners, NGOs and well-wishers.

Members and sometimes accompanied some selected staff always attend workshops, seminars and training /refresher courses organized by UFPEA or its development partners. The efforts of QAMA working with the relevant stakeholders in the fisheries sub sector have yielded great dividends as seen in the previous successful EU inspections not to mention a steady and compliant fish export trade. Uganda is now recognized by the EU commission as a fully harmonized country and accorded No. 1 list status of exporting countries. Individual QAMA members serve as the quality contact persons for their companies and their respective international

clients.

The financing of the QAMA is by an expense-based budget from the mother association (UFPEA) which is catered for annually.

The objectives of QAMA include; Promote quality and food safety among members. Share experience and technical skills. Capacity building which is both internal for new members and external capacity building based on needs assessment.

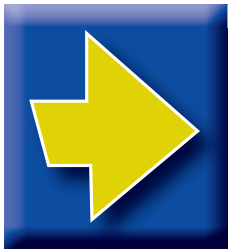
### Harmonization of quality management systems including HACCAP.

Technical lobbying and advocacy. This has led to the recognition by policymakers where QAMA's contribution is highly valued during policy development.

QAMA has also been a technical forum for public-private Partnerships. Hence QAMA is represented on technical committees like UNBS fisheries technical committee, East African fisheries technical committee, the African standards organization for fisheries.

Provided technical support to UFPEA. The chairman QAMA is a permanent member of the UFPEA Executive committee and hence technical support is fed into the process of the decision-making process.





# Kyoga Aquaculture Community Initiative helping fishing communities find more sustainable ways of living.

**The Aquaculture Community Initiative Kyoga (ACIK) is Community Based Organization (CBO) started by fishermen to help fishermen and their families find better and more sustainable ways to earn a living.**

Fishing has been a way of life for thousands, but with fewer fish in the lake, things are getting harder. ACIK has created a model to train, support, and guide fishermen and their families in fish farming (aquaculture)—a way to grow fish in ponds instead of depending only on the lake.

## Why aquaculture?

Fishing used to be easy. But now, many fishermen struggle because fish stocks are decreasing. Government restrictions and climate change are making the situation worse. With aquaculture, people can still make money from fish, but in a way that is more reliable, sustainable, and profitable. Instead of going out on the lake every day, they can grow fish in ponds and sell them at good prices. This means steady income, better food security, and less pressure on the lake.

**Removing barriers to fish farming**  
Fish farming offers fishing communities in Uganda a way to escape poverty. However, there are many barriers that can prevent fishermen from becoming fish farmers. ACIK's goal is to help is to enable fishermen and women to overcome those barriers by providing them with the knowledge, skills, and support they need to become successful fish farmers.

**Hands-on training in aquaculture.**  
ACIK's first objective is to create a fish farm for training local fishers how to farm fish properly. This includes setting up fish ponds, choosing the right fish, feeding them well, and keeping them healthy. With the right skills, aquaculture can be easy and successful. Business mentorship. Fish farming is not just about growing fish; it's also about making a profit. We train fish farmers on how to sell their fish, manage money, and plan for the future. This way, aquaculture becomes more than just a side job—it becomes a sustainable business.

## Financial support.

ACIK will enable graduates of its training program to start their own fish farms by providing low-interest loans as well as well as equipment, feed, and other resources.

## Environmental protection.

ACIK teaches farmers how to use eco-

friendly methods that do not pollute water sources or harm natural fish habitats. This means better fish for farmers without damaging the lake and surrounding areas.

## Cooperatives.

ACIK creates local cooperatives and combines them into a cooperative union in order to give fish farmers an advantage in both purchasing and marketing.

## Marketing.

ACIK helps farmers find buyers for their fish. Through our network, we connect farmers to restaurants, hotels, and fish traders so they can sell their fish at good prices and earn more.

**Extension services:** ACIK will provide new fish farmers with the technical support they need to solve problems and guarantee success. It will also keep them up to date with cutting-edge methods.

## More than just aquaculture

The ACIK model aims at helping improve the lives and livelihoods of fishing communities. It works to strengthen families so that they live in greater peace and harmony. It encourages family members to find new and different ways of making money so that they are not dependent on only one source of income.

It brings people together so that they can use the profits from aquaculture to improve health services, education, and infrastructure in their communities.

## Where is ACIK now?

ACIK is the process of putting its model into practice. It is currently trying to raise the capital to set up the training fish farm. ACIK welcomes foundations, government agencies, donors, and provide investors to contribute to this innovative, grassroots model for enabling people to pull themselves out of poverty.

The ACIK model can work in any community facing fishing challenges.

## Join us

If you are interested in helping create better livelihoods through sustainable aquaculture, please get in touch with. If you are a fisherman who is looking for a new and profitable way to earn a living, we want to hear from you. Together, we can make fishing communities stronger and more resilient!

Call/WhatsApp: +256781935902  
Email: okelloedmond11@gmail.com  
Website: <https://www.fisherfolk.org/>  
Location: Kaberamaido District, Uganda



Participants display their certificates after the training to guide fishermen and their families in fish farming and a way to grow fish in ponds instead of depending only on the lake



## FISH FARMING

# The Future of Aquaculture is Blue, Green, and Female: Redefining Cage Farming from the Grassroots Up



*A Yalelo Uganda worker feeding the fish in the cages at the farm. Youth contribute Labour in fish farming by providing security, cleaning, daily feeding and other support services in Aquaculture.*

**By Ntende Esther Connie Odongol, Terano Agro & Engineering Solutions (TAES) Ltd / AWYCA Initiative**

## 1. INTRODUCTION: PROMISE AND EXCLUSION IN UGANDA'S AQUACULTURE BOOM

Lake Victoria is at the heart of Uganda's growing aquaculture sector, especially in cage fish farming. Yet beneath its promise lies a barrier many cannot cross. For most women and young people, cage aquaculture remains a distant opportunity — gated by high capital requirements, licensing procedures, and technical complexity.

To begin cage farming, one needs access to lake space, approval from authorities, and the capital to construct durable cages, purchase floating feeds, and pay for labour. These requirements, often structured around formal, commercial operations, unintentionally exclude those with the most to gain from aquaculture: Uganda's smallholder farmers, unemployed youth, and rural women.

### But this exclusion isn't fixed.

At TAES Ltd, we are working with communities to reimagine what it means to enter and thrive in cage

aquaculture — with inclusive, locally rooted, and affordable innovations.

## 2. INNOVATION FROM NECESSITY:

### The TAES Story

TAES Agro Ventures began like many others — investing in cage fish farming only to be confronted with unsustainable feed costs, unreliable input supply chains, and a long path to profitability. Imported feeds, though high in nutritional content, were cost-prohibitive, leaving us — and many others — unable to break even, let alone scale up.

This challenge led us to begin producing our own eco-friendly floating fish feed using locally available ingredients such as brewery waste, crop residues, fish processing byproducts, BSF and plant proteins. While the innovation journey continues i.e. improvement on bioavailability of nutrients, our farm and several farmers rely 100% on this locally processed TAES feed, with other farms simply benefiting from the extrusion service at a fee, — affordable enough for small-scale cage farmers to sustain growth. But feed innovation alone wasn't enough!

## 3. LOWERING THE BARRIERS: A LOW-COST, INCLUSIVE MODEL

To truly democratize cage farming, TAES began innovating beyond the feed. We introduced bamboo cage systems — a low-cost, effective alternative to steel or High Density Poly-Ethylene (HDPE) cages. More importantly, we opened our own farm space to community-based farming partnerships.

### In this model:

- Youth without capital contribute labour in exchange for fish farming participation — providing security, daily feeding, and support services.
- Women's saving groups manage cage plots, sharing input costs, harvesting schedules, and profits.
- TAES benefits from a growing market for its feeds and a consistent production cycle.
- The community builds collective wealth, skills, and resilience.

This approach spreads risk, boosts local ownership, and lowers the entry bar for hundreds of potential farmers.

## 4. BEYOND INCLUSION: TOWARD SUSTAINABLE GROWTH

While our innovations have made cage aquaculture more inclusive,

they also point to Uganda's broader growth potential — if we commit to improving the entire production ecosystem.

Our feed production line is still evolving. To serve small-scale farmers at scale, we envision:

- Enzyme technology to improve nutrient bioavailability of our locally available raw materials by reducing the anti-nutrition factors (ANFs) thus reducing waste. This will also allow usage of more of the less expensive plant protein sources like brewers spent grain.
- Expanded use of black soldier fly (BSF) larvae and fish waste (scales, bones, viscera) as sustainable protein sources.
- Acquisition of a pin mill and solar dryer or a complete feed production line to enhance feed quality -texture, consistency, and shelf life.
- Full circular utilization of inputs — converting waste into value, creating jobs across the value chain.

Critically, there is a need to standardize local feed to rival imported feed quality. This calls for more research investment, public-private collaboration, and shared learning spaces where early innovators can transfer and/or acquire knowledge.

## 5. AWYCA INITIATIVE: SCALING A PROVEN APPROACH

In response to this growing impact, TAES registered the Association of Women and Youth in Cage Aquaculture (AWYCA) as a scaling platform for real, working innovations. Though not yet fully operational due to funding constraints, AWYCA's mission is clear:

### TO REPLICATE TAES' MODEL THROUGH

- Enhancing women and youth's capacity in cage fish farming through technical training, financial**



**literacy, entrepreneurship and mentorship.**

- Training in Cage Aquaculture – Covering topics including cage construction, disease management, feeding efficiency, water quality and post-harvest handling.
  - Financial Literacy & Entrepreneurship – Educating women and youth on savings, record-keeping, and cooperative financing.
  - Entrepreneurial Skills Training: Women and youth will be trained in business planning, market research, and financial forecasting to build profitable aquaculture businesses.
  - Value Addition & Product Development: Training on developing fish-based products, branding, and packaging to create competitive market products.
  - Marketing & Sales Strategies: Practical skills on online marketing, customer engagement, pricing strategies, and supply chain management.
  - Access to Finance & Investment Readiness: Training on microfinance options, loan application processes, financial management, and investor pitching.
  - Business Formalization & Compliance: Guidance on business registration, tax requirements, and legal considerations for aquaculture enterprises.
  - Cooperative Business Models: Understanding benefits of cooperatives, how to form and manage women/youth-led business groups, and strategies for collective bargaining.
  - Establishing a Fish Farmer Field School – Providing hands-on training on sustainable farming techniques, problem solving techniques to real problems in cage fish farming.
- B. Promoting collective action among women and youth farmers for better resource mobilization, market access, and finance.**
- Formation of Women and youth's Fish Farming Cooperatives – Reducing costs through group purchasing and pooling of resources.
  - Market Linkages & Advocacy – Connecting farmers with processors, supermarkets, and export markets while lobbying for gender and youth sensitive policies.
  - Access to Finance – Partnering with financial institutions to provide accessible loans.
- C. Developing and promoting research & innovation to lower production costs, improve profitability by exploiting missed income opportunities through:**
- Developing Affordable, Locally Made Fish Feeds – Utilizing BSF, agro-waste, and plant-based, single celled proteins.
  - Value Addition – Creating fish-based snacks and high-value

products (e.g., collagen, fish meal, fish oil) which will lead to increased fish consumption and utilisation ultimately improving value chain profitability.

- Sustainable Cage Farming Innovations – Improving designs and materials for cost-effective, eco-friendly cages from widely available inexpensive bamboo.
- Promoting Environmental responsibility & waste management through Sustainable cage construction using bamboo, responsible waste disposal, and recycling of used inputs (e.g., nets, plastics) while minimizing environmental impact and promoting long-term sustainability in aquaculture.

Unlike top-down development models, AWYCA builds on what is already functional at the grassroots level — making it a practical tool for national transformation.

**6. CONCLUSION: KNOWLEDGE IS POWER, AND POWER MUST BE SHARED**

Aquaculture's future is blue (aquatic), green (youth-driven), and female (led by women at the grassroots). Uganda's

opportunity lies in making knowledge, inputs, and access widely available. We don't need to reinvent the wheel. We need training in operation and maintenance of feed production equipment, exposure to proven feed innovations, and a culture of copying with pride from those who have already broken through. As Uganda hosts the world in this Aquaculture Safari, let us not only showcase our waters and our farms — let us showcase our willingness to learn, share, and grow together.

**About the Author**

Ntende Esther Connie Odongol is the founder and managing director of TAES Ltd, a growing agribusiness specializing in floating fish feed production, cage fish farming, and inclusive agripreneurship. She is also the founder of the AWYCA Initiative, a platform designed to empower women and youth through sustainable cage aquaculture. With a background in Industrial Chemistry, experience in brewing and a passion for rural development, she is committed to making aquaculture accessible, profitable, and transformative for the next generation.



**Training youth and women in cage farming covering topics like cage construction, feeding, disease management and water quality.**





EMPOWERMENT

# WOFIMA: A Model for Women’s Empowerment in Fisheries, Sustainability, and Food Security



Participating women from Butunduzi town council, Kyenjojo district, Kihuura sub-county, Kihuura sub-county, Kyenjojo district, Mabira town council, and Kyamutuzi town council markets

**The Women Fish and Markets Project (WOFIMA) is transforming the fisheries sector in Kyenjojo, Uganda, by empowering women through skills development, sustainable aquaculture, and enhanced market access.**

Launched in March 2024 as a YALI Visibility Fund project and funded by the U.S. Mission Uganda, WOFIMA addresses critical challenges, including post-harvest losses, malnutrition, and gender inequality in fisheries, ensuring women play a central role in food security and economic sustainability. Kyenjojo district faces alarming rates of child malnutrition, with nearly one-third of children under five experiencing stunted growth, peaking at 37% among children aged 18-35 months in rural and refugee-hosting communities. A high intake of fish significantly reduces stunting due to its rich composition of Omegas and essential micro- and macronutrients. However, economic struggles, post-harvest losses, and limited access to improved fish preservation

techniques have long hindered food security and sustainable livelihoods, particularly for vulnerable groups like lactating mothers.

To address these challenges, WOFIMA empowers women through training in fish farming, processing,

and business development. By equipping 120 women with modern fish preservation techniques and improved fish smoking kilns, the initiative enhances product quality, reduces food losses, and increases fish consumption. The training has sparked a ripple

effect, with the initial participants sharing knowledge within their communities, further expanding the project’s reach and impact. This initiative has not only boosted women’s incomes but also contributed to long-term community resilience and food security. Women play a crucial role in the fisheries sector, particularly in processing, marketing, and value addition, yet they face significant barriers such as limited access to financing, technology, and decision-making roles.

WOFIMA bridges this gap by supporting women entrepreneurs in accessing better markets and financial opportunities while advocating for gender-inclusive policies in fisheries management.

By emphasizing environmentally friendly fish production and sustainable post-harvest management, WOFIMA enhances long-term productivity, ensuring that small-scale fisheries remain profitable. The project’s focus on strengthening food security and nutrition is particularly vital in a region where fish consumption can be a game-changer in reducing malnutrition.

Looking ahead, WOFIMA aims to expand its impact by reaching more women in rural areas through training and technology transfer, integrating digital platforms for fish product sales, and advocating for gender-inclusive policies. By investing in women-led fisheries enterprises, WOFIMA uplifts communities, strengthens local economies, and ensures the sustainability of aquatic food systems. The initiative stands as a model for women’s empowerment in fisheries, paving the way for



Fish preserved using a smocking Kiln



A smocking Kiln



Women beneficiaries from the WOFIMA Project



# NAADS Interventions on Fish Farming in Uganda



*A modern fish pond set up. Uganda is widely covered by free flowing water that can be utilized for aquaculture production*

**Uganda produces up to 15 000 tons of fish from aquaculture, including production from small-scale fish farmers, emerging commercial fish farmers and stocked community water reservoirs and minor lakes. There are an estimated 20,000 ponds throughout the country with an average surface area of 500 m<sup>2</sup> per fish pond.**

In Uganda, the aquaculture enterprise is still in its take off stages despite it being practiced even in pre-colonial times. This has been mainly due to the fish from natural water bodies like lakes, streams and rivers being sufficient for the fish eating populations. However, due to the recent increase in population and high upshot of fish processing plants for export, the natural stocks have dwindled to alarming levels in that, meeting the domestic demand alone is going to be a problem without providing alternative sources of fish.

Aquaculture therefore presents the major alternative to natural water bodies in as far as fish production is concerned. Uganda is widely covered by free flowing water that can be utilized for aquaculture production and even the large water bodies like lakes and rivers can be utilized for fish cage establishments.

## \*Fish technologies provided by NAADS\*

Under NAADS, a number of districts have come up with requests to be supported in terms of provision of inputs for support under the aquaculture enterprise. The support is in form of fish fingerlings and start-up fish feeds.

However, being at takeoff and since a living organism is to be reared in a controlled environment, a number of factors have to be fulfilled by an intending fish farmer. These factors can be categorized as those needed for the successful growth of a fish and institutional requirements for the success of the program.

## \*Selection Criteria and Technical Requirements\*

In order for the fish farming projects to succeed, it is important to undertake proper selection of farmers/ beneficiaries. There are 3 major requirements for the beneficiary pond suitability for fish farming as described below:

### Water availability:

Good sites should have good sources of water visible like streams, springs available at least throughout the year in because fish lives and does everything in water. It is the most critical factor to consider.

Pure clay cracks during hot weather and is very minimal in nutrients hence it should not be considered. Sandy soil is not desirable because water easily percolates through and hence a lot of water is lost. Areas with sandy soils and extremely clay soils should be therefore avoided.

### Size and shape of the pond:

For commercialization of the enterprise, ponds need to be at least more than 300m<sup>2</sup>. The ponds must be rectangular for easy management, with a gentle slope for easy drainage, dykes must be well compacted and with a slope at least of 2:1.

The minimum water depth should be 1M at the outlet and 0.8M at the inlet. Inlet and outlet pipes must be fitted well.

The inlet and outlet pipes should be well screened.

## \*Identification of potential beneficiaries\*

The selection and verification exercise is conducted by technical teams from the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), NAADS, OWC together with the beneficiary district local governments.

Source: NAADS website.

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## EMPOWERMENT

# Every Fish Farmer needs a mentor; the mentee has become a mentor.



By Gladys Bwanika (PhD), CEO,

PEARL AQUATICS LTD



Successful fish farming demands for technical knowhow among other factors, an aspect often gained from technical instruction followed by a series of experiences. It follows that the performance of a given farm is a replica of the capacity of the management team inclusive of the day-to-day workers on the farm. While medium to large scale fish farmers often have the financial strength to hire knowledgeable and experienced management personnel, most small to lower medium fish farmers and emerging fish farmers do not prioritise hiring experienced and often highly paid personnel as one of the primary drivers of the farm.

The experiences of Pearl Aquatics Limited, a woman-led, technically-driven medium scale cage fish farming company draw back to their genesis in 2015, a period of emergency of the medium scale cage fish farmers in Uganda. The founder and CEO, Gladys Bwanika (PhD) had taught fisheries and aquaculture courses in Makerere University for a period of 15 years, but had not gained sufficient practical experience of the day-to-day running of a fish farm, more so on a commercial level, not until an opportunity emerged to launch into fish farming and to walk the theoretical knowledge.

"This was a turning point in my teaching career, as teaching now made more meaning with practical experiences, opening up a new page of teaching delivery to my students while also opening up my theoretical knowledge to a new world of practical commercial fish farming".

There was a lot to learn and unlearn. Every single day on the farm had a challenge to solve which needed more than theoretical knowledge.

There was need to look out for a mentor, some one to walk us the journey of fish farming without loosing time and making avoidable financial losses.

Amazingly, the first mentor turned out to be a former student in the Fisheries and Aquaculture class, recommended by the Pearl Aquatics Ltd CEO (as a former teacher) for a junior rank job at the first commercially established cage fish farm in Uganda. By this time, Robert had grown through the ranks and held a position of a Farm Manager. What started as a one-time consultation soon became a routine between Pearl Aquatics team and Robert, as much insight was needed from sourcing supplies, to production techniques, harvesting, sourcing markets and pricing. Every other single moment, there was an issue for which guidance was needed.

In due course a partner to Pearl Aquatics introduced another highly experienced fish farmer and technical expert, Damien, who was undertaking consultancy work in the region, and offered to extend a monthly routine mentorship by way of introducing production models that were to be followed and performance analysed at every monthly inventory. Much capacity was gained through these monthly mentorship visits and exchange of production reports, and the farm greatly improved in productivity and length of the production cycle. These two informally arranged mentee



Dr. Gladys, CEO Pearl Aquatics undertaking training in fish sampling for women under Women Economic Empowerment Project in Bugiri district.

– mentorship relationships boosted a successful launch of Pearl Aquatics Ltd with an out put of 83 tonnes in the first production cycle and raising to 110 tonnes in the following year with just improved management. Significant capacity impact was latter achieved when Msingi East Africa, now Gatsby Africa introduced a formal aquaculture mentorship program as an accelerator to industrial aquaculture growth in East Africa, through which Pearl Aquatics Ltd received a one-year grant to partake of the program together with other selected medium sized fish farms in Uganda. Through this mentorship program, ACMS (contracted mentors) with vast experiences, introduced production

and finance models to which mentorship and coaching was undertaken that turned around the understanding of management of commercial fish farms to real time management experiences. Farming was never again driven by a nonexcepted end, but rather farming for a known end.

The managing process was to achieve a known desired end causing increased diligence in the day-to-day farm activities. Following the one-year mentorship program, Pearl Aquatics Ltd took on significant strides in development of technical management services that birthed Pearl Aquatics Management Services Ltd, a subsidiary of Pearl Aquatics Ltd that provides aquaculture consultancy, management services and capacity building. In addition, Pearl Aquatics Ltd undertook a technical task offered by UNWomen – Bugiri district's 'climate smart - Women economic empowerment project' to establish a 450 tonne cage fish farm and to mentor and coach 1400 rural women, 90% uneducated to successfully own and manage the established fish farm at all levels of its value chain.

The women economic empowerment project now turned WEEB Ltd is a living demonstration of how mentorship and coaching can equip the educationally disadvantaged women and youths to adopt aquaculture technical skills towards efficient and production intensive systems. Mentorship programs can fasten adoption of technical and non technical experiences needed for enhanced aquaculture production.

Uganda's 1 million tonne target necessitates vast capacity building which would take much more time to build if only structural education systems are used. Besides, even trained candidates to degree levels have a lot to learn from capacity gained by experience. Advocacy for mentorship programs should be propelled and formally adopted for the benefit of existing and emerging small to medium scale fish farmers and those along their path of development to large scale.

Gladys Bwanika (PhD), CEO,  
 Pearl Aquatics Ltd & Pearl Aquatics  
 Management Services Ltd



Training of Women and Youths in a mentorship approach at WEEB and Pearl Aquatics farms



# Ugandan Women in Fisheries Progress with Global Standards of Fish Processing

By Emily Arayo Arineitwe

**“Fisheries and women are on the rise in Uganda”, celebrates Mariam Nankya during the International Women’s day commemoration in Kyankwanzi district on the 8th of March 2025.**

Mariam is a fish vendor from Owino market in Kampala who uses the captivating phrase that “Women handle fish better” as a way of attracting buyers, she sells smoked tilapia *Oreochromis Nilotica* fish, fish powder from Silver fish *Rastrineobola argentea* and deep fried (ready to eat) Nile perch *Lates niloticus*.

She calls customers to buy her fish because she is confident, she has been trained in fish value addition and processing, price negotiation and marketing by her association -SheFish that is a member of the Uganda National Fish Organization (UNWFO). Mariam is among more than two million (2,000,000) women fish processors and traders organized under the UNWFO and her fish trade reflects what many members of UNWFO do along the shores of Lakes Victoria, Kyoga, Albert, George, Edward, River Nile, and the major towns in Uganda. When the World Aquaculture Society formed the Conference theme for the Safari 25 as ‘Aquaculture on the Rise’, it speaks to the result of advocacy by many agencies and government in promoting fisheries production through Aquaculture. The rise not only in Aquaculture mirrors the efforts women and youth are bringing to harvesting, processing, trading, orienting, and training in all value chain nodes of the fisheries sector in Uganda. Women are developing fisheries with high quality and keen attention to safety of fish. UNWFO points to the realization that Africa’s growing aquaculture industry, promotes research, innovation, and global partnerships across value chains like feed, investment, trade, and technology. The women organization works with the National Agricultural Research Organization (NARO) to understand Fisheries regulations and management of fisheries starting with the right fishing gears to the best postharvest fish smoking Kiln, the FIK-3 PAH safe smoking kiln. developed by NARO. Engineer Alphonse Candia, the researcher and inventor of the



**Martha Nangobi from Katosi Women of Hope smokes fish using the fish smoking Kiln**

fish smoking kiln notes that the fish smoking kiln is the first of its kind in Uganda and Africa in general. Stating that the process of researching and developing this kiln started in 2013 and in 2018 and have since modified it increasing in size and capacity. “The kiln creates a smoke-free environment and reduces exposure burnt.” The NARO PAH Safe Fish Smoking Kiln reduces smoking time, thus freeing women to attend to other productive roles,” he adds.

UNWFO member associations are utilizing this new technology. One is Perus Logose, a fish processor from Kiyidi Women Fish Processors Association, says previously their smoked fish was on low demand by potential customers from outside Uganda on grounds of cancerous smoke. “When we used the local fish smoking methods, we had challenges whenever local customers made big orders demanding smoked fish in large quantities,” she says. “Today we use the kiln and the sales have gone up because the fish is safe and we appreciate the National Agricultural Research Organisation (NARO) that invented this modified fish smoking kiln, as a way of addressing such

challenges” she adds.

Eng. Candia says Uganda could not export her smoked fish to foreign markets, especially the European Union (EU) because smoked fish contained toxic elements, up to 40,000 parts per billion (ppb) carcinogens of polycyclic aromatic hydrocarbons (PAHs). Polycyclic aromatic hydrocarbons contain 4 toxic elements such as benzo (a) pyrene, benz (b) anthracene, chrysene and benzo (b) fluoranthene.



**Emily Arayo points to the name Fish Smoking Kiln from NARO**

The EU Commission Regulation 2015/1125 direct that smoked fish should only have a maximum of 12 parts per billion of the 4 toxic elements of polycyclic aromatic hydrocarbons. Of these 12 total parts per billion, it requires that benzo (a) pyrene alone should not exceed 2 parts. The high levels of toxic elements in the smoked fish arose due to local processors entirely depending on the traditional hot smoking method.

He observes that “whereas most of these traditional methods may be affordable, they do not filter these toxic elements from the hard wood that generate the required heat and flavours for smoking. In addition to eliminating foreign matter contaminants in the smoked fish, the newly developed kiln made a breakthrough in reducing these toxic elements from 40,000 parts per billion to less than 1 part”.

Safety of the Narofik-3 kiln consists of the smoke generating unit, smoke delivery system, smoke filter and the dehydration chamber. Smoke generation unit produces hot smoke or obtains the required flavour in the smoked fish.

The smoke delivery system conveys the generated smoke into the filter, which removes the bad compounds of the smoke, and continues to the dehydration chamber where the fish is placed and dehydrated to the required consumer test along with a good flavour. It helps conservation of the environment through reducing the usage of firewood by at least 42%. UNWFO founded in 2019 is dedicated to empowering women and youth in Uganda’s fisheries and aquaculture sector with a mission to strengthen the participation of women, youths and Ppersons with Disabilities in sustainable fish production and trade.

Working with more than two million (2,000,000) women registered members nationwide, UNWFO provides a platform for advocacy, knowledge-sharing and training. It works in partnership with the government of Uganda’s Ministry of Agriculture Animal Industry and Fisheries (MAAIF) and regional and continental networks including the African Women Fisheries Network (AWFISHNET) whose Chairperson is the President of UNWFO -Madam Lovin Kobusingye.

**The writer is the Development Communications Officer of the National Agricultural Research Organization (NARO)**



## FISH FARMING

# Sustaining Aquaculture in Tropical Lakes: Lessons from Cage Farming in Lake Victoria

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**Cage fish farming in Lake Victoria by Yalelo, the biggest Aquaculture Farm in Uganda**

## Abstract

This study explored the environmental effects of Nile tilapia (*Oreochromis niloticus*) cage aquaculture on water quality in Lake Victoria, the largest tropical lake globally and a vital resource for millions. Focusing on four distinct sites distributed along a natural limnological gradient, researchers collected water samples in March 2023 and March 2024. This design allowed the team to capture both spatial and interannual variations in water chemistry. Cage and control stations were established at each site to assess localized impacts. The study assessed key water quality indicators, including: dissolved oxygen (DO), pH, and silica, chosen for their ecological relevance and sensitivity to anthropogenic stress. Results consistently showed significant differences in water quality between cage and non-cage areas. Lower DO, altered pH levels, and reduced silica concentrations were prevalent near cages. These changes were attributed to organic waste accumulation, increased microbial respiration, and nutrient-driven shifts in silica cycling.

The lake's dynamic hydrology further modulated these impacts, sometimes masking or amplifying the aquaculture footprint. The findings underscore the complex interplay between aquaculture practices and natural systems, emphasizing the importance of adaptive, site-specific management. Given Lake Victoria's history of eutrophication and ecological stress, the study serves as a critical warning against poorly regulated expansion of cage farming. Moreover, the

research contributes valuable methodological insights for sustainable aquaculture development in other tropical freshwater bodies. It demonstrates the importance of combining robust scientific monitoring with policy oversight to balance aquaculture growth with ecosystem health.

## What has worked:

A key strength of this study was the use of a well-replicated spatial and temporal sampling design, which allowed researchers to disentangle aquaculture-related impacts from the lake's natural variability.

By conducting water sampling in the same month (March) over two consecutive years (2023 and 2024), the researchers minimized the influence of seasonal fluctuations in rainfall, temperature, and lake mixing processes. This consistency enhanced the reliability of year-to-year comparisons and helped isolate more persistent anthropogenic effects from ephemeral natural changes. The selection of four diverse sites spanning a natural limnological gradient from nutrient-rich inner gulfs to more oligotrophic offshore waters provided a broad ecological context. This gradient-based approach allowed the study to capture a range of environmental conditions and aquaculture intensities. Within each site, cage and non-cage (control) stations were sampled, facilitating direct comparisons and enabling detection of localized water quality alterations due to cage farming activities. Moreover,

the study focused on key physicochemical parameters, dissolved oxygen (DO), pH, and silica that are known indicators of aquatic ecosystem health. These variables respond predictably to nutrient loading and microbial activity, making them particularly useful in detecting early signs of environmental stress. The consistent identification of statistically significant differences between cage and control stations across multiple sites validated the effectiveness of these indicators.

Lastly, the ability to detect meaningful ecological signals despite the lake's inherent variability highlights the robustness of the sampling methodology. This approach provides a strong foundation for future monitoring efforts and sets a high standard for aquaculture impact assessments in large, dynamic water bodies.

## Why it has worked:

The study's effectiveness lies in its thoughtful alignment of sampling strategy with the ecological and hydrodynamic characteristics of Lake Victoria. The lake is known for its complex limnology, with spatial heterogeneity driven by wind patterns, inflow from rivers, and basin morphology. Recognizing this complexity, the researchers intentionally selected study sites that represented a spectrum of hydrological and ecological conditions. By doing so, they accounted for the inherent variability of the lake and

increased the generalizability of their findings.

Additionally, by targeting DO, pH, and silica, the study leveraged parameters that are both sensitive to nutrient enrichment and ecologically meaningful. Dissolved oxygen provides insight into microbial activity and organic matter decomposition; pH reflects chemical and biological processes influenced by nutrient loading; and silica is integral to the growth of diatoms, a key component of the lake's phytoplankton community. Changes in these variables serve as early warning indicators of ecosystem disruption, thereby enhancing the study's relevance to lake management. Temporal replication was another critical element. By sampling in March of two successive years, the study minimized the confounding influence of seasonal variability, such as rainy season nutrient pulses or dry season stratification. This approach helped isolate longer-term trends and anthropogenic impacts from short-term natural fluctuations.

Furthermore, the direct comparison of cage and control stations allowed for the attribution of observed changes to aquaculture practices with greater confidence. This paired sampling design, combined with replication across diverse sites, ensured that results were not site-specific anomalies but indicative of broader patterns associated with cage aquaculture.

## What lessons were learned:

The study revealed several important lessons about the ecological consequences of cage aquaculture in tropical freshwater lakes. First, it became clear that the environmental impact of aquaculture is highly site-specific. Locations with dense cage concentrations and limited water circulation such as sheltered bays or nearshore embayments exhibited the most pronounced degradation in water quality. In contrast, sites with deeper water and stronger hydrodynamic flushing showed milder impacts, suggesting that natural water movement can help dilute and disperse aquaculture waste.

Second, the study reinforced the idea that cage aquaculture can exacerbate existing environmental problems, particularly eutrophication. Lake Victoria has long struggled with nutrient enrichment due to watershed land-use changes, agricultural runoff, and urban wastewater. The addition of nutrient-rich effluents from fish cages uneaten feed, fish excreta, and other organic materials can further fuel algal blooms and oxygen depletion, especially in poorly flushed areas. This raises concerns about the cumulative impact of multiple stressors on lake ecosystems.

Third, shifts in silica concentrations point to more subtle ecological changes. Silica is essential for diatoms, which form the base of many aquatic food webs. A reduction in silica availability can alter phytoplankton composition, favoring non-siliceous groups such as cyanobacteria. These shifts can cascade through the ecosystem, affecting zooplankton, fish populations, and overall biodiversity.

Another important lesson is the value of integrating limnological knowledge into aquaculture planning. Understanding the physical and chemical dynamics of the lake can help identify suitable locations for cage deployment and inform best practices. Finally, the study highlighted the need for continuous monitoring and adaptive management to respond to emerging environmental signals and mitigate long-term impacts.

**Continued to page 23**



# Science-to-Policy Lab (SPoL) in Mombasa, Kenya, Deliberates on Availability of Small-scale Aquatic Food Systems

**Globally, food production is sufficient to meet the needs of all in regards to food security, however, in most cases there are instances of malnutrition and hunger reported at different scales in different regions.**

This could largely be attributed to challenges in the distribution, access, affordability, utilization, and wastage of food. Concurrently, as the world's human population grows, the food sector continues to exert significant environmental pressure, particularly through greenhouse gas emissions and eutrophication which affects several food production sources.

In addition, several lifestyle diseases have in the recent past impacted the consumption of some food sources more specifically red meat. This calls for an urgent need for a transition towards secure, sustainable, and equitable food systems. The aquatic bodies cover huge space globally and are being prioritized to produce diverse aquatic foods that can serve the global populations sustainably while providing necessary nutrients as well. Small-scale fishers along the coastal region play a major role in boosting food security not only for the residents at the coast but also for the country as a whole. Whereas they play critical roles in developing our nutrition, millions of individuals including fishers, processors, and traders, who depend on small-scale fisheries to support their livelihoods feel that policies supporting this sector are not favorable to support the industry to provide the much-required food resources.

More frequently, policies have always been developed using a top-down approach with no due consideration involving those low in society and those affected mostly by such policies. Establishing suitable mechanisms to get the voice of all through science-to-policy lab workshops ensures that they are all included in policy development. Involvement of all, ensuring their rights, supporting sustainable fisheries practices, and integrating them into governance structures and policy will go a long way in strengthening their roles in food security. Thus, there is a need for the government and stakeholders to put more effort into ensuring there are all-inclusive frameworks that support small-scale aquatic food system producers.

A sustainable aquatic food supply that meets the needs of all people is a good indicator of consideration and acceptance that food insecurity in the country is a challenge that needs to be addressed through the development of appropriate policies geared at constantly improving the food security sector through diversification in production of diverse aquatic foods like seaweeds, prawns, finfish, etc. through aquaculture interventions. It's under this back group that the science-to-policy lab on sustainable aquatic food systems was organized and brought diverse stakeholders to the table to look at different options that will boost food security and develop policies that will encompass all actors in the fisheries sector without discriminating against any actor.

"Sustainable Agri-Food Systems Intelligence – Science-Policy Interface" is a project geared towards knowledge exchange for an understanding of best strategies to improve food security, nutritional benefits, livelihoods, and gender inclusivity for small-scale actors within the aquatic food systems. This project underscores the importance of embracing cultural diversity and the use of Indigenous knowledge from the local communities to enhance the sustainable utilization of aquatic



Prof. Konstantinos Karantininis - making a point

resources and create an all-inclusive approach to bridging challenges in the aquatic food systems.

To bring all stakeholders on board to deliberate on policies to ensure inclusivity a workshop was organized that involved policy-makers, researchers, non-governmental organizations, the business community, and farmers (Producer organizations) in Mombasa, Kenya themed "Strategies for improving food security, nutritional outcomes, livelihoods, and gender equality for small-scale actors within the aquatic food systems."

The workshop explored to have the participants understand the implication of having one stakeholder group make decisions on behalf of others versus the inclusivity aspect when all are considered including making all gender considerations. It was clear that some decisions could be made by the educated elites but did not address the needs of the producers or the business community while others could favor the researchers and not the policy makers or the NGOs. However, through undertaking all possible considerations, effective policy decisions to support the small-scale aquatic food systems were developed that included "Enhance the capacity of non-fishing communities to consume aquatic value-added products by taking advantage of sensitization and campaigns" among others.

Different producer organizations participated in the workshop to present their view on policies affecting the small-scale aquatic food systems. Kibokoni Umoja Self Help Group in Kilifi Creek, Kilifi County in Kenya. Is a local community that engages in mariculture: (rearing marine species like crabs, milkfish, rabbitfish, and marine tilapia in earthen ponds. The Kibokoni community Mariculture project has helped to improve the livelihoods of the community as well as their nutrition due to the consumption of fish which enriches them with protein, omega 3,6, and other rich vitamins and minerals."

The workshop attracted over 100 participants from 9 countries (Kenya, Uganda, Tanzania, Zambia, Burundi, Mozambique, Seychelles, Mauritius, and Madagascar) apart from facilitators, had interactive sessions conducted including presentations from different actors showcasing the need to hold more workshops to share knowledge and expertise as a road map to bridging food insecurity as well as influencing the consumption of fish among the regional

communities to boost food security and nutrition. The workshop speakers highlighted that livelihoods of hundreds of millions of people are directly or indirectly dependent on fisheries and aquaculture and thus the need to put more focus on aquaculture as a major source of aquatic foods globally.

However, as communities everywhere, including many parts of Africa, work toward sustainable development, they encounter obstacles when attempting to utilize the resources found in fisheries and aquaculture, such as infrastructure limitations, climate change-related effects, accessibility, and inclusivity issues. Contributions from the different actors heightened the need to collaborate with diverse multidisciplinary actors in the aquatic food systems to address the available challenges affecting the aquatic food systems through the development of policy frameworks to remedy these challenges as a whole. To obtain more information from the stakeholders and experts, the workshop was divided into three different segments allowing the members to delve into deeper deliberations on how to effectively bring on board the disadvantaged groups in the society especially indigenous communities, women, and children to ease access and availability of aquatic food.

The discussions also emphasized developing alternative working frameworks to eradicate available barriers hindering the already progressive adoption of aquaculture practices in the country and support effective collaboration among communities, the national government, and all stakeholders

at different levels. The central benefit of having women in the aquatic food systems was underscored during the deliberations.

Prof. Konstantinos Karantininis the team leader from the Swedish University of Agricultural Sciences believes that putting into action recommended policies to achieve success entails bringing everyone on board from the fishers to the consumers. He emphasized the need for community members to be at the forefront in championing the strategic development of policies that will benefit them locally and in the aquatic food systems sector. "For this advice and strategies to succeed, we need the collaboration and involvement of the subjects of these policies. The subjects of these policies are everybody in the agrifood systems including farmers, fishers, researchers, processors, producers, and consumers," he said.

After a series of deliberations in Siros, the group discussion culminated with a voting exercise, with the stakeholders voting for a total of six policies, two coming from each group. The actors voted for the six policies put forward with an effort to understand policies that needed more priority and the influence they would have once implemented. Takeaways from the science-to-policy lab discussions included the fact that small-scale fisheries play a crucial role in providing coastal communities with a social safety net and alternative sources of income when other economic opportunities are scarce. Therefore, it is essential to create a supportive work environment that can assist and engage with various stakeholders involved in small-scale fishing and aquaculture. Additionally, the significance of health management in aquaculture and the critical role government regulations play in fostering the long-term expansion of the sector was also emphasized during the conference, as well as the improvement of nutritional needs among individuals. Our increased efforts to solve the worldwide issues endangering aquaculture through research will be necessary to create sustainable small-scale aquatic food systems was the clarion call with all actors forging to work together as a team to combat challenges affecting the industry.

"We need to bring together all the different actors as we have done in this science-policy lab (communities, stakeholders at global, regional, national, subnational, and local levels) and undertake candid discussions to mainstream integrated and holistic approaches to the development of the small-scale aquatic food systems sector," noted Dr David Mirera from Kenya Marine and Fisheries Research Institute (KMFRI).

## Common Commercial Fish Species in Uganda

- Nile tilapia (*Oreochromis niloticus*)
- Nile perch (*Lates niloticus*)
- Rastrineobola argentea (Mukene)
- Brycinus nurse (Ragoge)
- Neobola bredoi (Muziri)
- Bagrus docmak (Semutundu)
- Clarias gariepinus (Emmale)
- Hydrocynus spp (Tiger fish)
- Protopterus aethiopicus (Lung fish, emamba)
- Alestes spp (Angara)



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Continued from page 22

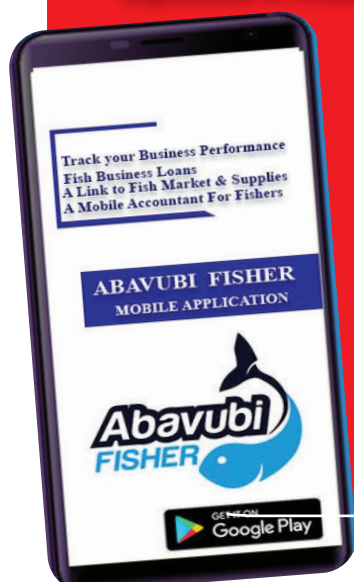
## How it could be done elsewhere:

This study provides a replicable model for assessing the environmental impacts of aquaculture in other tropical lakes and reservoirs. The key to success lies in tailoring the sampling design to the local ecological context while maintaining methodological rigor. For instance, selecting study sites that span natural gradients in nutrient levels, water depth, and circulation patterns can provide a comprehensive understanding of aquaculture impacts under varying conditions. Establishing both cage and control stations is essential for distinguishing anthropogenic effects from background variability. Temporal replication ideally during the same season in multiple years can help differentiate short-term fluctuations from persistent trends. Emphasis should be placed on monitoring ecologically relevant indicators like DO, pH, and silica, along with other site-specific parameters such as chlorophyll-a, turbidity, or ammonia, depending on local concerns.

In terms of implementation, strong regulatory frameworks and institutional support are crucial. Local governments and environmental agencies must enforce guidelines on cage density, waste management, and site selection. Aquaculture zoning based on ecological sensitivity can prevent overcrowding and reduce cumulative impacts. Community engagement is also vital. Involving local fishers, farmers, and other stakeholders in monitoring efforts can enhance data collection, build trust, and foster sustainable practices. Capacity-building initiatives can empower communities to participate in decision-making and adopt eco-friendly technologies. In areas already facing eutrophication or other stressors, additional interventions may be required. These could include mechanical aeration (using solar), artificial circulation, or phytoremediation using aquatic plants to absorb excess nutrients. By combining science-based monitoring with proactive management, other regions can pursue aquaculture development without compromising water quality and ecosystem integrity.

An elaborate published article can be found at the following URL: <https://www.sciencedirect.com/science/article/pii/S038013302500070X>

## Abavubi / Fisher: A Digital Lifeline for Uganda's Fisherfolk



Abavubi Fisher App, developed by FFOU with GIZ and German government support, is transforming the fisheries sector in Uganda's Lake Victoria region. This pioneering platform offers fisherfolk a digital market-place, financial record-keeping, safety tools, and vital health and legal aid services through a smartphone or USSD, even offline.



## TANZANIA: FAO trains and builds capacity 510 leaders and members of TAWFA on Village Community Banks (VICOBA)



Cash-Books and VICOBA toolkits were handed over to the group leaders. Photo: FAO/Edward Kondela  
Successful pilot phase implementation

### Morogoro, Tanzania |

**From September 30 to November 3, 2024, 510 leaders and members of the Tanzania Women Fishworkers Association (TAWFA) were trained on Village Savings and Loans Associations (VSLA) and Village Community Banks (VICOBA), a key community-based microfinance model.**

This initiative was organized by the Ministry of Livestock and Fisheries (MLF) in collaboration with the Food and Agriculture Organization (FAO) under its project, "Implementing the Small-Scale Fisheries Guidelines for Gender-Equitable and Climate-Resilient Food Systems and Livelihoods – Phase 2."

The trainings were facilitated by VSLA and VICOBA experts, Mr. Sosthene Milobo from Aga Khan University and Mr. James Golola from WWF, alongside FAO National Project Coordinator Ms. Oliva Mkumbo and members of the National Task Team for small-scale fisheries (SSF NTT) for implementing the National Plan of Action for Small-Scale Fisheries (NPOA-SSF).

The trainings were delivered in two phases. The first phase, known as the Training of Trainers (ToT), took place over four days in Morogoro, starting on 30 September 2024. This session provided intensive learning opportunities, with practical exercises and assessments for trainers.

The second phase focused on community-level training and involved training at least 20 members from each of the 30 TAWFA/VICOBA groups. The trainings' objectives were:

- To teach participants the fundamental concepts of the VSLA methodology.

- To equip them with facilitation skills for implementing the VSLA methodology.
- To enable participants to form effective savings groups, access loans from their collective savings, and follow proper VSLA procedures.

VICOBA is a community savings and credit model that operates by pooling regular weekly contributions from members into a common fund. Members can access these funds either through rotational sharing or short-term loans, provided at an agreed-upon interest rate. VICOBA has become a preferred strategy for addressing livelihood and financial challenges in underserved communities.

As part of the initiative, 30 VICOBA toolkits were procured and distributed by the project to group leaders. Each toolkit included a secure cash savings box with three locks, passbooks for record-keeping, stamps and markers for marking shares, record books, visitor registers, a draft constitution tailored to each group's needs, and a comprehensive VICOBA guidebook for reference. These materials are instrumental to enable the establishment and operation of the groups.

The trainings organized during phase two of the project build on the success of the trainings piloted during phase one. The pilot phase demonstrated the effectiveness of VICOBA as a tool for empowering small-scale fisheries communities. The initiative provided members with the means to access affordable credit, stimulating financial resilience and contributing to sustainable livelihoods. The positive results showcased the potential of community-based microfinance models in driving development and improving the lives of small-scale fishers and their families.

In 2021 the MLF adopted the NPOA-SSF to implement the SSF Guidelines in the country. The NPOA-

SSF for Tanzania identified the lack of access to affordable finance and credit services as one of the main constraints in securing and developing small-scale fisheries. Aligning with this, one of the objectives of the TAWFA Strategic Plan (2023 – 2030) is to establish and enhance affordable financial services for small-scale fishers, and among its strategic actions is to support the establishment of VICOBA for TAWFA. From 2022 to 2023, the MLF through FAO, supported by the "Creating an enabling environment for securing sustainable small-scale fisheries" project, piloted VICOBA in four districts: Sengerema, Muleba, Mpwapa, and Mkuranga. This pilot phase began in October 2023 with the training of 10 TAWFA change agents, followed by the development of VICOBA groups in the selected districts. A total of 164 small-scale fisheries actors—including fishers, processors, traders, and local officials—participated in these initial efforts, which resulted in the establishment of eight VICOBA groups across the districts. The operations of these groups commenced in November 2023 and were closely monitored between August 3 and August 16, 2024. Financial performance indicators assessed during the monitoring included the value of savings, utilization of social funds, loan amounts disbursed, purposes of loan utilization, and the value of outstanding loans.

By August 2024, the total savings across all groups had reached \$23,776\*, with the highest savings reported at \$6,332\* and the lowest at \$1,254\*. The groups had collectively loaned out \$42,580\* to 141 members, 124 of whom were women. The largest amount loaned by a single group was \$11,135\*, while the smallest was \$1,953\*. Approximately \$36,448\* (85.6%) of the total loans were utilized to support activities in the fisheries value chain.

\* Using a conversion rate of 1 Tanzanian Shilling = 0.0004 USD